Total No. of Questions : 10]

SEAT No. :

P1

[Total No. of Pages : 2

[5871]-501

B.E. (Civil)

ENVIRONMENTAL ENGINEERING-II

(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Discuss the following zones of a stream which is undergoing self-purification. **[5]**

i) Zone of degradation.
ii) Zone of active decomposition.
iii) Zone of recovery.
iv) Zone of clear water.

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

OR

Q2) a) Draw a neat sketch of primary sedimentation tank showing different zones of sedimentation. Also comment on the performance of primary sedimentation tanks with reference to removal of suspended solids and corresponding BOD removal. **[4+1]**

b) Estimate the screen requirement for a plant treating a peak flow of 50 million litres per day. Assume velocity through screen is 0.8% m/s and size of bar 10mm width and 50 mm clear spacing and the bars placed 60^{o} to the horizontal. **[5]**

Q3) a) Define the terms with respect to activated sludge process. **[5]**

i) Hydraulic retention time.
ii) Mean cell residence time.
iii) Food to microorganism ratio.
iv) Sludge volume index.
v) Sludge recirculation ratio.

b) Write biological principle, advantages and disadvantages of sequential batch reactor. **[1+2+2]**

OR

Q4) a) Explain trickling filter in detail with a neat sketch and biological processes involved in it. **[5]**

b) Explain the terms.

i) Self-cleansing velocity.
ii) Variations in the sewage flow. **[2+3]**

P.T.O.

Q5) a) Write wastewater treatment principle of phytoremediation technology and explain its working with schematic sketch. **[4+4]**

b) Design an oxidation pond for treating sewage from a hot climatic residential colony with 5000 persons. The sewage generation is about 135 litres per capita per day. The BOD_3 at 27º C is 200 mg/lit. BOD loading in hot climate is 300 kg/ha/d. BOD removal rate constant = 0.23/ day, depth of pond is 1.5m. **[8]**

OR

Q6) a) Explain the principle of working of aerated lagoon. Also state its merits and demerits over to oxidation pond. **[4+2+2]**

b) Write water treatment principle of root zone cleaning system and explain its working with schematic sketch and write its application. **[4+3+1]**

Q7) a) Explain working principle and application of MBR, MBBR and FMBR. **[8]**

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

OR

Q8) a) Draw a flow sheet and discuss the working principle of package sewage treatment plant. Write advantages and limitations of the same. **[4+2+2]**

b) Write principle and stages of anaerobic digestion. Explain factors affecting digestion process. **[2+3+3]**

Q9) a) Explain neutralization unit process with respect to its working principle, need, factors affecting the process and application. **[9]**

b) Give the range of important characteristics of waste water from following industry and draw a suitable flow diagram for treatment for each industry.**[9]**

i) Dairy industry.

ii) Distillery industry.

OR

Q10)a) Explain Recycle and reuse of treated wastewater with example. **[6]**

b) Explain in brief primary, secondary and tertiary treatment process adopted for treating industrial wastewater. **[2+2+2]**

c) State the sources and characteristics of sugar wastewater and draw suitable treatment flow sheet. **[2+2+2]**

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

P2 **[Total No. of Pages : 3**

[5871]-502
B.E. (Civil)
TRANSPORTATION ENGINEERING
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No. 2, Q.No.3or 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 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) Roads are the arteries of the nation, on which prosperity of nation spread "comment"? **[5]**

b) Discuss the second twenty year road development plan and its salient features? **[5]**

OR

Q2) The radius of horizontal curve is 400 m, the total pavement width at curve is 7.6 m and the super elevation is 0.07. Design the transition curve length for speed of 100 Kmph. **[10]**

Q3) a) Find the stopping sight distance on a highway at a descending gradient of 1 in 40 for a design speed of 65 Kmph. Assume other data as per IRC recommendations **[5]**

b) Enlist various methods of conducting the Origin and Destination Studies and explain any one in brief. **[5]**

OR

Q4) a) Explain the importance of highway drainage in increasing the serviceability of the road **[5]**

b) Estimate the basic capacity of traffic lane at a speed of 60 Kmph. Assume that all the vehicles are of average length of 6.0 m **[5]**

P.T.O.

Q5) a) How are Cutbacks prepared? What are the different types of Cutbacks? State their advantages. **[6]**

b) Explain in brief the procedure of conducting 'Ductility Test' on bitumen. **[6]**

c) Write a note on types of Bitumen. **[5]**

OR

Q6) a) Explain briefly the Marshall method of bituminous mix design. **[6]**

b) How is foamed bitumen produced? state where they can be used. **[6]**

c) Write a note on Polymer Modified Bitumen. **[5]**

Q7) a) Calculate the cumulative number of standard axles for a design of new flexible pavement for a two lane undivided carriage way using the following data: **[6]**

i) Subgrade soil CBR = 5.0%

ii) No of heavy vehicles per day in september 2014 = 150

iii) Design life = 15 years

iv) Annual rate of increase in the heavy vehicles = 5.0%

v) Vehicle Damage Factor = 3.5

vi) Lane Distribution factor = 0.75

The road is proposed to be completed in September, 2019

b) Explain the concept of ESWL with a neat sketch. **[6]**

c) Differentiate between flexible and rigid pavements **[5]**

OR

Q8) a) What is CBR? Calculate the CBR value of a soil sample, if the load sustained by specimen at 2.5 mm and 5.0 mm penetration is recorded as 62.7 kg and 91.2 kg respectively. **[6]**

b) Discuss in brief load stresses acting on a rigid pavement. **[6]**

c) Define 'Vehicle Damage Factor'. Explain its importance in the design of flexible pavement. **[5]**

Q9) a) Differentiate between Cold Mix and Hot Mix Asphalt Technology. **[5]**

b) Explain in brief the construction process of Bituminous Macadam (BM) **[6]**

c) Explain the importance of providing prime Coat, tack coat and seal coat in pavements. **[5]**

OR

Q10)a) Write a note on Dry Lean Concrete? **[5]**

b) How is the structural evaluation of pavement done using FWD? **[6]**

c) Explain how WMM layer is prepared in the field. **[5]**

Total No. of Questions : 10]

SEAT No. :

P3

[Total No. of Pages : 3

[5871]-503
B.E. (Civil)
Structural Design and Drawing - III
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Explain the P-line and C-line concept for finding the stresses in a section of prestressed beam. **[4]**

b) A simply supported post tensioned concrete beam has a rectangular cross section of 420 × 670 mm. It is prestressed by strands of 400 mm^2 area carrying initial prestressing force of 450 kN. The profile of the prestressing wire is parabolic with zero eccentricity at support and 75 mm at mid span. The transfer of stress takes place at the age of 14 days. Calculate loss of stress due creep in general using IS 1343 provisions for relative humidity 90%. Take M50 grade of concrete, Es =200 Gpa. **[6]**

OR

Q2) a) Explain the procedure to design two way prestressed slab. **[4]**

b) The permissible compressive stress in concrete is 14 MPa and permissible tensile stress in concrete is 1.4 MPa. A pre-stressed concrete beam is pre-stressed with 12 wires of 3 mm diameter as shown in Fig. 2. The wires are subjected to a pre-stress of 1000 MPa. Neglecting all the losses, determine the total sagging moment that can be applied to the beam during service stage. The cross section of the beam at mid span is as shown in the Fig. 1. **[6]**

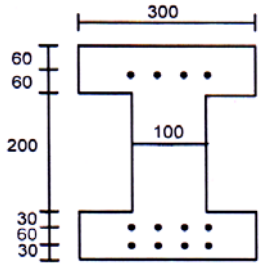

Fig. 1

P.T.O.

Q3) a) A post-tensioned bonded prestressed concrete beam is prestressed by 300 mm^2 of high tensile steel located at an eccentricity of 100 mm. The cross section of the beam is 230 mm wide and 400 mm deep. Using the codal provisions of IS 1343, estimate the ultimate moment capacity of the section. Take the characteristic cube compressive strength of concrete as 40 MPa and the characteristic tensile strength of prestressing steel as 1600 N/mm^2. **[4]**

b) What are Flat slabs? Explain the procedure to find the cable profile in flat slab in relevance to the cable zone. **[6]**

OR

Q4) a) Explain the design of a prestressed section for shear using the codal provisions. **[4]**

b) A continuous flat slab spread over area of 24 m × 24 m is supported by columns of 500 mm × 500 mm with drop of 2m × 2 m at 8 m c/c in both directions. Calculate design moments for an interior and exterior slab panel. Adopt LL=4 kN/m^2 and FFL= 1.0 kN/m^2. **[6]**

Q5) a) Explain with neat sketches, the deformation of T shape retaining wall and show the position of the main reinforcement to be provided. **[3]**

b) Propose suitable dimensions and perform the stability analysis for 4 m high T- shaped retaining wall provided to retain a backfill inclined at angle of 12° having unit weight equal to 18 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 = 1.0m. **[13]**

OR

Q6) Design a L-shaped retaining wall of height 5.2 m to retain a submerged levelled backfill. Dry density of soil is 18 kN/m^3 and submerged density is 12 kN/m^3 and angle of repose equal to 28º. Coefficient of friction between concrete and soil = 0.55, SBC of soil 150 kN/m^2, depth of foundation = 1.2 m. Sketch the details of reinforcement in the wall and base slab. **[16]**

Q7) a) Explain the limit state of serviceability criteria for design of water tanks. **[6]**

b) Design a circular water tank with fixed base for a capacity of 80, 000 litres. Use Fe 500 grade of steel and M30 grade of concrete. Provide detailing of reinforcement. **[12]**

OR

Q8) Design a rectangular water tank open at top resting on ground having a size of 7 m × 3.0 m × 3 m high. Use M 30 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

Q9) a) Explain in brief the following terms related to theory of vibration : **[8]**

i) Degree of freedom ii) Resonance

iii) Damping ratio iv) Mathematical model

b) Determine the seismic forces in X and Y direction at each floor level for the residential RCC structure of 12 m height shown in the Fig. 2. The building is located in seismic zone V. The soil conditions are medium stiff. The special moment resisting RC frames are in-filled with brick-masonry. The lumped weight due to dead loads may be taken as 12 kN/m^2. The floors are to cater a live load of 4 kN/m^2 on floors and 1.5 kN/m^2 on the roof. Consider floor height as 3 m. **[8]**

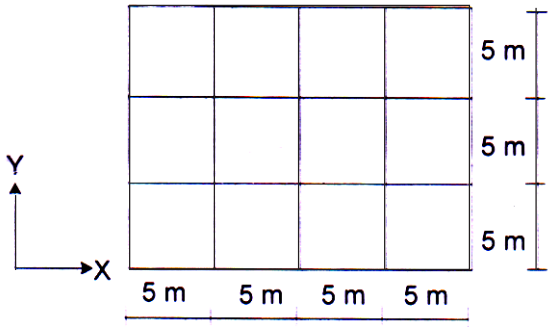

Fig.2

OR

Q10) a) Determine the equivalent stiffness and natural frequency for the system shown in Fig. 3. Take L = 1.5 m. E = 200 GPa, I = 1000 mm^4, m = 10 kg, stiffness of spring = k = 1 kN/m. **[8]**

Fig. 3

b) Explain how the combined effect of lateral forces and vertical loading are considered for the analysis of multistoried frames. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P4

[Total No. of Pages : 2

[5871]-504

B.E. (Civil)

STRUCTURAL DESIGN OF BRIDGES

(2015 Pattern) (Elective - I) (Semester - I) (401004A)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q. 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***If necessary, assume suitable data and indicate clearly.***
4) ***Use of electronic pocket calculator is allowed.***

Q1) What is impact loading? How is it calculated for highway bridges? **[10]**

OR

Q2) Explain for a four-lane bridge the arrangement of live loads. **[10]**

Q3) Explain Pigeaud's method with a suitable example. **[10]**

OR

Q4) Design the deck slab of a highway bridge for the given data. **[10]**

a) panel size - 3.0 m × 4.0 m

b) loading - IRC class AA tracked vehicle

c) $m_1 = m_2 = 0.12$

Any additional data may be suitably considered.

Q5) Design the top chord member of a Pratt truss of a railway bridge. The details of the bridge are given below. **[18]**

a) panel size = 3.0 m × 12 panels

b) c/c between top chord and bottom chord member = 5.1 m

c) spacing of truss = 4.5 m

d) weight of check rail and stock rail = 0.30kN/m and 0.50 kN/m respectively

e) sleepers of size = (0.18×0.18×2.5) m @0.50m c/c

f) EUDL for BM and SF are 5,890 kN and 6,866 kN respectively

g) CDA = 0.20

P.T.O.

OR

Q6) For the Problem given in Q.5, design the bottom chord member. **[18]**

Q7) What is the function of rocker bearings? Explain the design procedure. **[16]**

OR

Q8) Explain step-by-step design procedure for an elastomeric bearings. **[16]**

Q9) Explain step-by-step procedure how piers are designed? **[16]**

OR

Q10) Explain the procedure for design of abutments. **[16]**

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Total No. of Questions : 10]

SEAT No. : ____

P5

[Total No. of Pages : 4

[5871]-505

B.E. (Civil)

SYSTEMS APPROACH IN CIVIL ENGINEERING

(2015 Pattern) (Elective - I) (Semester - I) (401004B)

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.***

Q1) a) Explain with the help of neat sketches following terms : **[6]**

i) Local optima

ii) Global optima

iii) Concave function

iv) Convex function

b) Differentiate between linear & non linear programming methods. **[4]**

OR

Q2) a) Find out the optimal sequence and total elapsed time. (machine sequence A-B-C) : **[6]**

Jobs	1	2	3	4	5
m/c A	20	27	31	15	19
m/c B	7	9	6	12	14
m/c C	27	31	16	11	12

b) Define : **[4]**

i) System length

ii) Total time in the system

P.T.O.

Q3) a) Solve following transportation problem using least cost method & Row minima method. **[6]**

		B_1	B_2	B_3	B_4	
	A_1	7	12	6	15	28
	A_2	19	9	15	11	32
Origin	A_3	6	18	13	16	14
	A_4	12	17	8	10	19
		21	15	24	33	

Destination

b) For the arrival rate of 9 minutes between two consecutive arrivals & service rate as 3 minutes between 2 consecutive services, find **[4]**

i) Probability that a person will have to wait

ii) Average queue length

iii) Average time a consumer spends in the system.

OR

Q4) a) Solve following assignment problem : **[6]**

	I	II	III	IV	V
1	10	5	9	18	11
2	13	9	6	12	14
3	3	2	4	4	5
4	18	9	12	17	15
5	11	6	14	19	10

b) What are the applications and limitations of simulation technique? **[4]**

Q5) a) Use two phase method to **[8]**

Minimize $Z = x_1 + x_2$

Subject to $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$

$x_1, x_2 \geq 0$

b) What is Big M method? Explain with suitable example, procedure to solve L.P. problem using Big M method. **[8]**

OR

Q6) a) A plant manufactures two products A & B. The profit contribution of each product has been estimated as Rs. 20 for product A and Rs. 24 for product B. Each product passes through three departments of plants. The time required for each plant for each product & total time available in each department are as follows. **[4]**

Hours required

Department	Product A	Product B	Available hours
1	2	3	1500
2	3	2	1500
3	1	1	600

b) Explain : **[4]**

i) Slack variable

ii) Surplus variable

iii) Artificial variable

c) Solve the following using Big M method : **[8]**

Maximize $Z = 4x_1 + 5x_2 - 3x_3$

Subject to $x_1 + x_2 + x_3 = 10$

$x_1 - x_2 \geq 1$

$2x_1 + 3x_2 + x_3 \leq 40$

$x_1, x_2, x_3 \geq 0$

Q7) a) What are the differences between Dichotomous search & Fibonacci search method? Explain with the help of suitable example. **[8]**

b) Give the algorithm to solve multivariable optimisation without constraints using Newton's method. **[8]**

OR

Q8) a) Write a detail note on Hessian matrix and its applications. **[8]**

b) State the algorithm for steepest ascent / descent technique. **[8]**

Q9) a) Find the shortest path between A and I with following distances (in km). **[6]**

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

b) Find the values of X and Y so that the following game has a saddle point. **[6]**

	Player B		
Player A	18	Y	36
	X	54	99
	63	27	36

c) Explain the theory behind replacement of items ignoring time value of money. **[6]**

OR

Q10) a) Explain Bellman's principle of optimality. Also state applications of Dynamic Programming. **[6]**

b) Solve the following game : **[6]**

	B			
A	1	7	2	4
	0	3	7	8
	5	2	6	10

c) A company has a machine whose cost is Rs. 30.000/- its maintenance cost & resale value at the end of different years are as given below : **[6]**

Year	:	1	2	3	4	5	6
Maintenance cost (Rs.)	:	4,500	4,700	5,000	5,500	6,500	7,500
Resale value (Rs.)	:	27,000	25,300	24,000	21,000	18,000	13,000

Calculate minimum economic life of the machine.

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Total No. of Questions : 10]

SEAT No. :

P6

[Total No. of Pages : 4

[5871]-506

B.E. (Civil)

ADVANCED CONCRETE TECHNOLOGY

(2015 Pattern) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q. 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***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 short note on Alkali aggregate reaction. **[4]**

b) Enlist various laboratory test of cement with their practical utility. **[6]**

OR

Q2) a) Write a short note on structural light weight concrete. **[4]**

b) Enlist the properties of concrete in plastic state and hardened state. Explain any one in details. **[6]**

Q3) a) Explain how High performance concrete is differ from High Strength concrete. **[4]**

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

i) Jet cement concrete

ii) Mass concrete

OR

Q4) a) What is the significance and objective of mix design? **[4]**

b) Explain in details electrical methods of non-destructive testing method. **[6]**

P.T.O.

Q5) a) Explain historical development of fiber reinforced concrete. **[6]**

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

c) Write short note on polymeric fibers and polypropylene fibre. **[6]**

OR

Q6) a) Explain stress strain property and compressive strength of FRC. **[6]**

b) Enlist different natural occurring fibre .Explain any two in brief. **[6]**

c) Explain the behaviour of GFRC under tension, compression and flexure. **[6]**

Q7) Using Indian standard recommended guidelines, design a concrete mix grade M40 for the following requirements : **[16]**

a) Stipulated For Propagation :

i) Characteristic strength at 28 days - 40 MPa

ii) Maximum nominal size of aggregate - 20mm

iii) Type of aggregate - crushed angular aggregate

iv) Degree of supervision - Good

v) Degree of workability - 100mm (slump)

vi) Exposure condition - Pumping

vii) Method of concrete placing - Pumping

viii) Chemical admixtures type - Super-plastizer

b) Characteristics of Materials :

i) Type of cement - OPC 43 grade

ii) Specific Gravity of cement - 3.15

iii) Chemical Admixture - Super-Plasticizer

iv) Aggregate

v) Fine aggregate conforming to grading Zone 1

	Fine Aggregate	Coarse Aggregate
Specific Gravity	2.74	2.74
Water Absorption	1.0%	0.5%
Free (surface) moisture	Nil	Nil

OR

Q8) Using Indian standard recommended guidelines, design a concrete mix grade M 25 for the following requirements : **[16]**

a) Stipulated For Propagation :

i) Characteristic strength at 28 days - 25 MPa

ii) Maximum nominal size of aggregate - 20mm

iii) Type of aggregate - crushed angular aggregate

iv) Degree of quality control - Good

v) Source of aggregate - Natural

vi) Degree of workability - 75mm (slump)

vii) Grading Zones:

II) Coarse Aggregate - II

II) Fine Aggregate - II

b) Characteristics of Materials :

i) Type of cement - OPC 53 grade

ii) Specific Gravity of cement - 3.15

iii) Bulk Density - 1450kg/m^3

	Fine Aggregate	Coarse Aggregate
Specific Gravity	2.6	2.65
Bulk Density	1750	1800
Free (surface) moisture	1.5 %	Nil
Water Absorption	0.6 %	1.0 %

c) Mix Design Consideration :

i) t = 1.65

ii) For moderate exposure condition with normal weight aggregates of 20 mm nominal maximum size and for RC work

iii) Minimum cement content - 300kg/m^3

iv) Maximum free water cement ratio - 0.5

Q9) a) Describe SIFCON material with reference to definition, structure properties and its application. **[6]**

b) Explain the quality control test to be conducted on fibre reinforced concrete. **[6]**

c) What is aspect ratio and how it can influence the properties of composite. **[4]**

OR

Q10) a) Explain detail interaction between fibre matrix composite under cracked condition. **[6]**

b) Explain the procedure to mix fibres in concrete. Why workability of concrete reduces with addition of fibres? **[6]**

c) Write a short note on SFRC. **[4]**

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Total No. of Questions : 8]

SEAT No. :

P7

[Total No. of Pages : 2

[5871]-507

B.E. (Civil)

ARCHITECTURE & TOWN PLANNING

(2015 Pattern) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Enlist architectural planning principles and explain the outcome after adopting architectural planning principles. (Minimum two principles outcome) **[7]**

b) What is Landscaping? What are the benefits of landscaping? **[7]**

c) Elaborate concept of New Towns on basis of the following points : need, where developed normally and why? Authorities for development, outcome. **[6]**

OR

Q2) a) Elaborate how role of "Urban Planner and Architect" differ in relation with the "spatial organization". **[6]**

b) Explain the meaning of livability and quality of life and explain relation between these. **[7]**

c) Explain the steps to be followed in preparation of DP Proposal as per MRTP Act 1966. **[7]**

Q3) a) Enlist : Various types of Civic Surveys Required to be conducted for DP and explain any one with its use. **[8]**

b) Enlist planning authorities. Elaborate the purpose of the same. Explain the organizational structure with its function for any one of them. **[9]**

OR

Q4) a) How the data collected from Civic Surveys is used by planning authorities during any renewal proposals? **[8]**

b) What is traffic management? Mention its importance in todays context. Also mention the hierarchy of urban roads. **[9]**

P.T.O.

Q5) a) Write a note on URDPFI Guidelines and its uses. **[9]**

b) Enlist and elaborate salient features of MAHA-RERA. **[8]**

OR

Q6) a) Write a note on importance of Land Acquisition Rehabilitation and Resettlement Act. **[9]**

b) What are the objectives of Real Estate (Regulation and Development) Act 2016? How it can be implied? **[8]**

Q7) a) Write a note on ; "AMRUT Guidelines" and "CRZ". **[8]**

b) How GIS is useful in town planning? Elaborate with an example. **[8]**

OR

Q8) a) Write a note on ; "Special townships" and "SEZ". **[8]**

b) How Remote Sensing is useful in town planning? Elaborate with an example. **[8]**

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Total No. of Questions : 6]

SEAT No. : ____

P8

[Total No. of Pages : 3

[5871]-508

B.E. (Civil Engg.)

Advanced Engineering Geology with Rock Mechanics

(2015 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Differentiate between red tachylytic basalt and red bole **[6]**

OR

b) Explain the origin of tachylytic basalt in the context of recent work.**[6]**

Q2) a) State characters of alluvium of Deccan Trap rivers. **[7]**

OR

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

Q3) a) R.I.S. in Deccan trap area. **[7]**

OR

b) Write a note on Compact basalt and amygdaloidal basalt as construction material. **[7]**

P.T.O.

Q4) a) Explain in detail R.S.R. Classification. **[8]**

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

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

OR

a) What are various physical properties of rocks. **[8]**

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

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

Q5) a) Explain in detail any two case histories of dam sites in Maharashtra, where tail channel erosion is occurring. **[10]**

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

OR

a) Discuss relationship between local Geology and location of Spillway in Deccan Trap. **[10]**

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

Q6) a) Discuss with suitable examples occurrence of fractures and dykes during tunneling. **[10]**

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

OR

a) Explain in detail engineering geological investigation for bridge foundation. **[10]**

b) Whether the tunnels are suitable through limestone and quartzite. **[7]**

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Total No. of Questions : 8]

SEAT No. :

P9

[Total No. of Pages : 3

[5871]-509

B.E. (Civil Engineering)

MATRIX METHODS OF STRUCTURAL ANALYSIS

(2015 Pattern) (Semester - I) (Elective - II) (401005A)

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) ***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.***

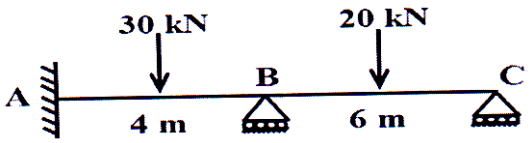
Q1) a) Solve the following system by Gauss-Jordan Method. **[6]**

$$x + y + z = 5$$

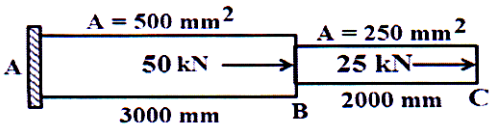
$$2x + 3y + 5z = 8$$

$$4x + 5z = 2$$

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



c) Determine nodal displacement in the bar structure as shown in figure using stiffness matrix method. Take E = 210 GPa. **[6]**

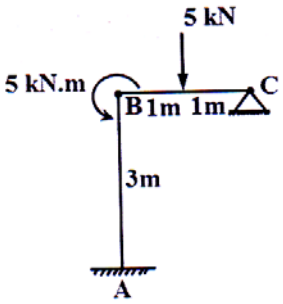


OR

P.T.O.

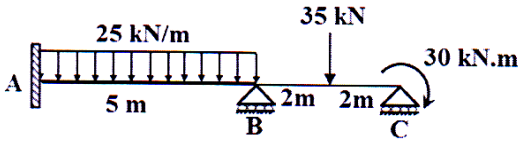
Q2) a) Write computer algorithm and flowchart for Gauss-Elimination Method. **[6]**

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



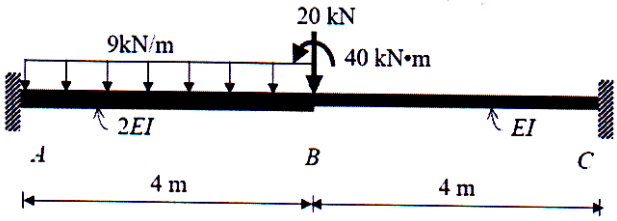
c) Derive the transformation matrix and stiffness matrix of a truss member with four degrees of freedom. **[6]**

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

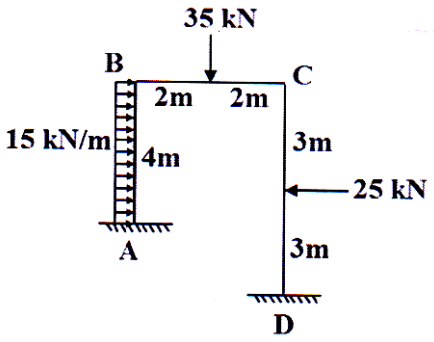


OR

Q4) Analyze the continuous beam ABC as shown in figure using member approach of stiffness matrix method. Take EI constant. Draw BMD. **[18]**

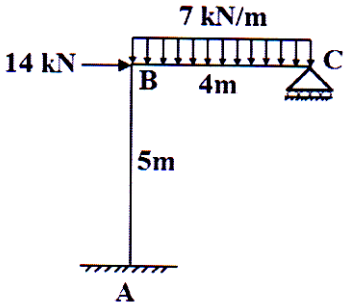


Q5) Analyze the portal frame ABCD as shown in figure using stiffness matrix method. Neglect axial deformation. Take EI constant. Draw BMD. **[16]**



OR

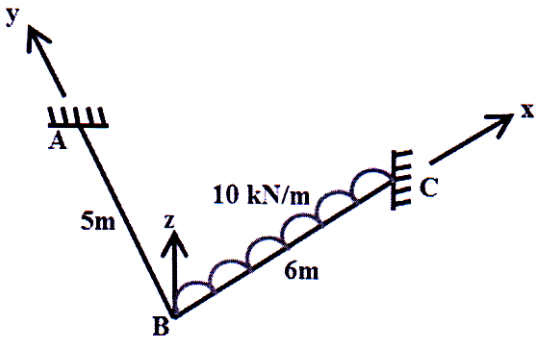
Q6) Analyze the portal frame ABC as shown in figure using stiffness matrix method. Neglect axial deformation. Take EI constant. Draw BMD. **[16]**



Q7) Derive stiffness matrix and transformation matrix for grid member/element with 06 degrees of freedom. **[16]**

OR

Q8) Determine unknown joint displacements of the two member grid structure as shown in figure using stiffness matrix method. EI = 1000 kNm^2 and GJ = 500 kNm^2. **[16]**



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Total No. of Questions : 12]

SEAT No. :

P10

[Total No. of Pages : 2

[5871]-510

B.E. (Civil)

Integrated Water Resources Planning And Management

(2015 Pattern) (Elective - II) (Semester - I) (401005B)

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 side indicate full marks.***
4) ***Assume suitable data if necessary and mention it clearly.***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) How the use of rights for water is made? **[3]**

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

OR

Q2) a) What is meant by permit system? **[3]**

b) Which are the water infrastructure-problems? **[3]**

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

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

OR

Q4) a) How the benefit cost analysis is carried out in IWRP explain? **[3]**

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

Q5) a) What is the use of geo-informatics for drought management? **[4]**

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

OR

Q6) a) How to do the assessment of flood damage? **[4]**

b) How the Recycling and reuse of water can be done? **[4]**

P.T.O.

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

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

OR

Q8) a) Explain in detail necessity of water management in urban sector. **[8]**

b) How the irrigation demand estimated? What is mean by irrigation efficiency? **[8]**

Q9) a) Write a note on water quality management for various uses. **[8]**

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

OR

Q10) a) Explain Direct/Indirect benefits of water resource development on employment generation. **[8]**

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

Q11) a) Define Watershed. How the watersheds are classified? Explain integrated approach for watershed management. **[8]**

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

i) Contour Bunding

ii) Strip Cropping

iii) Bench Terracing

iv) Check Dams

OR

Q12) a) Define RS & GIS. Write a role of RS & GIS in watershed management. **[8]**

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

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Total No. of Questions : 10]

SEAT No. :

P11

[Total No. of Pages : 2

[5871]-511

B.E. (Civil Engineering)

TQM & MIS in Civil Engineering

(2015 Pattern) (Elective - II) (Semester - I) (401005C)

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.***

Q1) a) Explain the various reasons for poor quality in construction. **[6]**

b) Discuss the advantages of TQM in Construction. **[4]**

OR

Q2) a) Explain the following quality control tools. **[6]**

i) Histogram

ii) Pareto Diagram

b) Explain the various phases of QFD. **[4]**

Q3) a) Explain the following ISO principles in brief. **[6]**

i) Involvement of People

ii) Customer Focus

b) Write short note on quality manual. **[4]**

OR

Q4) a) Develop a checklist concreting activity. **[6]**

b) Explain causes and preventive measure of any two construction defects. **[4]**

P.T.O.

Q5) a) Explain peer benchmarking and limitations of benchmarking. **[8]**

b) Explain the following. **[10]**

i) Internal Failure cost

ii) External failure cost

OR

Q6) a) Quality Circle team is must in construction organization. Justify the statement with suitable examples. **[8]**

b) Explain the steps followed in benchmarking process. **[10]**

Q7) a) Explain in detail 5 'S' techniques in detail. **[8]**

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

i) Jamuna Lal Bajaj Award

ii) Zero defect

OR

Q8) a) Discuss in detail various stages of implementation of FEMA. **[8]**

b) Explain the following in detail. **[8]**

i) Individual kaizen

ii) Group Kaizen

Q9) a) Explain in detail the concept of data and information. **[8]**

b) Discuss the role of MIS in construction projects. **[8]**

OR

Q10) a) What are the objectives of MIS for any organization. **[8]**

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

i) Operating Support System

ii) Transaction processing system

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Total No. of Questions : 12]

SEAT No. :

P12

[Total No. of Pages : 2

[5871]-512

B.E. (Civil)

EARTHQUAKE ENGINEERING

(2015 Pattern) (Elective - II) (Semester - I) (401005D)

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) ***Use IS 456-2000, IS 1893 and electronic pocket calculator is allowed.***
3) ***Neat sketches must draw wherever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Assume suitable data if necessary.***

Q1) Enlist past earthquake and discuss lessons learnt from damages in earthquake? **[6]**

OR

Q2) Write a Short Note on Elastic Rebound Theory. **[6]**

Q3) Derive the equation of motion for a damped forced vibration of a SDOF system. **[7]**

OR

Q4) What is mean by damping? Explain the types of damping? **[7]**

Q5) Summarized philosophy of seismic design? **[7]**

OR

Q6) Explain ductility and factors affecting ductility. **[7]**

Q7) a) Explain the effects of unsymmetrical geometry and masses of the structure. **[8]**

b) Explain the concept of shear wall and its behaviour. **[8]**

OR

P.T.O.

Q8) a) Explain the following terms. **[8]**

i) Torsion irregularity.

ii) Weak storey.

b) Explain the effects of unsymmetrical geometry and masses of the structure? **[8]**

Q9) a) Write short note on : **[8]**

i) Response Spectra

ii) Effect of shear wall

b) Explain the procedure for estimation of combined effect of lateral forces and vertical loading on multistory frame? **[10]**

OR

Q10) a) What are the various methods available to control the lateral forces acting on a structure? Explain in details? **[10]**

b) Explain with neat sketches concept of Ductile detailing of column beam joint. **[8]**

Q11) a) Explain any three retrofitting techniques used for masonry buildings. **[8]**

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

OR

Q12) a) Write a detailed note on Base isolation technique and Tunned mass damper. **[6]**

b) Explain the various rescue operations in disaster management. **[6]**

c) Explain in detail the various stages in Disaster Management. **[4]**

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Total No. of Questions : 10]

SEAT No. :

P13

[Total No. of Pages : 2

[5871]-513

B.E. (Civil)

Advanced Geotechnical Engineering

(2015 Pattern) (Elective - II) (Semester - I) (401005E)

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

Instructions to the candidates:

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

Q1) a) Write a note on clay water relation. **[5]**

b) Explain in detail cantilever sheet pile wall. **[5]**

OR

Q2) a) Enlist different criteria for soil classification and explain any one in detail. **[5]**

b) Explain any one graphical method to calculate earth pressure. **[5]**

Q3) a) Write down applications of geosynthetics in geoenvironment. **[5]**

b) Write a note on design of cantilever retaining wall. **[5]**

OR

Q4) a) Discuss reinforcement of soil beneath foundation. **[5]**

b) Write a note on slope stabilization using soil nails. **[5]**

Q5) a) How to determine dynamic soil properties of soil. **[6]**

b) Write a note on acceptable level of strain under dynamic loading. **[6]**

c) Write a note on linear elastic weightless spring method. **[4]**

OR

P.T.O.

Q6) a) Explain different types of machine foundation. **[6]**

b) Explain elastic half space method. **[6]**

c) State the difference between static and dynamic behaviour of soil. **[4]**

Q7) a) Explain in detail vibrofloation technique. **[6]**

b) Explain ground improvement by compaction pile. **[6]**

c) Explain concept of freezing soil. **[4]**

OR

Q8) a) Explain different grouting techniques with their suitability. **[6]**

b) Explain deep mixing technique. **[6]**

b) Write a note on ground improvement by dynamic loads. **[4]**

Q9) a) Explain Rheology and Rheological models. **[6]**

b) Discuss secondary consolidation. **[6]**

c) Discuss compound Rheological model. **[6]**

OR

Q10) a) Write down the limitations of Rheological models. **[6]**

b) What is the fundamental requirement of rheological model? **[6]**

c) Discuss creep by giving suitable example. **[6]**

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Total No. of Questions : 12]

SEAT No. : ____

P14

[Total No. of Pages : 3

[5871]-514
B.E. (Civil)
DAMS & HYDRAULIC STRUCTURES
(2015 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10, Q11 or Q12.***
2) ***Neat labelled diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic talbes slide rule, molier charts, electronic pocket calculator and steam is allowed.***
5) ***Assume sutable data if necessary.***

Q1) Define a "Dam" & differentiate between Large & small dams. **[2+4]**

OR

Q2) What is piezometer? Briefly explain following types of piezometers.

a) Pneumatic piezometer

b) Vibrating wire piezometer

[2+4]

Q3) Write any six external forces acting on gravity dam along with their equations. **[6]**

OR

Q4) a) State the classification of Arch dams. when are the arch dams suitable. **[4]**

b) State advantages and limitations of 'Buttress dams'. **[2]**

Q5) a) What is meant by 'Spillway'? state its purposes Explain syphon spillway with sketch. **[6]**

b) Suggest a suitable type of spillway gate, it the span is 45m and height is 10m. **[2]**

OR

Q6) a) State four types of spillway gates and explain any one with neat sketch. **[4]**

b) Explain 'U.S.B.R stilling basin IV' with the help of neat sketch. **[4]**

P.T.O.

Q7) a) Determine factor of safety for the slope. In a slip circle analysis of downstream slope of a dam during steady seepage, the section of dam was drawn to a scale 1 cm = 5m & results obtained were.

i) Area of N- rectangle = 15.25 cm^2

ii) Area of T-rectangle = 6.5 cm^2

iii) Area of U-rectangle = 5.2 cm^2

iv) Length of arc = 12.5 cm

v) Effective angle of friction = 26°

vi) Unit cohesion = 0.2 kg/km^2

vii) Unit weight of Soil = 2g/cm^3.

[8]

b) Write note on khosla's theory application for design of structure on permeable foundations. Also explain the importance of exit gradient. **[6]**

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

OR

Q8) a) Define phreatic line **[2]**

b) Determine the phreatic line through homogeneous earthen dam section with following details. **[8]**

i) Slope of up stream face = 3:1

ii) Slope of downstream face = 2.5:1

iii) Top width = 10m

iv) Height of dam = 23m

v) Free board = 3m

vi) Length of horizontal drainage blanket = 30m

Note : [For calculation, consider internal of x coordinates as 10m]

c) Draw a labelled sketch of diversion headworks Also enumerate the function of each component. **[8]**

Q9) a) Design an irrigation channel to carry 15 cumecs of discharge. The channel is to be laid at a slope 1:5000 the critical velocity ratio for the soil is Use kutters rugosity coefficient as 0.0225. **[8]**

b) Define canal falls and state any six types of canal falls. **[4]**

c) Explain trapezoidal notch fall with the help of neat sketch. **[4]**

OR

Q10)a) Design a regime channel for a discharge of 50 cumecs and silt factor 1.1, using Lacey's theory. **[8]**

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

i) Canal falls

ii) Canal outlets

iii) canal escapes

iv) Canal regulators

Q11)a) What do you mean by C.D. works? Write the factors for selection of C.D. work. Also Explain Design consideration of it. **[8]**

b) Write short notes on **[8]**

i) Level crossing

ii) Inlet and outlet

OR

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

i) Super passage

ii) Siphon aqueduct

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

i) Embankment or levees

ii) Groynes or spurs

Total No. of Questions : 12]

SEAT No. :

P15

[Total No. of Pages : 4

[5871] - 515

B.E. (Civil)

QUANTITY SURVEYING CONTRACTS AND TENDERS

(2015 Pattern) (Semester - II)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State the types of approximate estimate. Explain plinth area estimate with example. **[3]**

b) What is the necessity of considering contingency & work charge establishment & how much amount is usually considered for Civil Engineering Work. **[3]**

OR

Q2) a) Discuss briefly DSR or SSR & elaborate on its use in Civil Engineering Work. **[2]**

b) Prepare approximate estimate for a proposed commercial complex for shopping mall with the following details Plinth area = 750 sqm/floor, Height of each floor = 3.0m No of Storey's = G + 2

Cubical content rate = Rs. 3000/m^3 **[4]**

i) Water supply & sanitary connection – 10%

ii) Electrical connection at 7%

iii) Providing Road & Lawn at 5%

iv) Architectural finish at 3%

P.T.O.

Q3) Work out detailed estimate for the following item of Work for the framed structure shown in fig.1.

a) Footing for column in M20 **[4]**

b) CCM20 for RCC column **[2]**

c) Quantity of steel considering 1% for footing, 2% for column. **[2]**

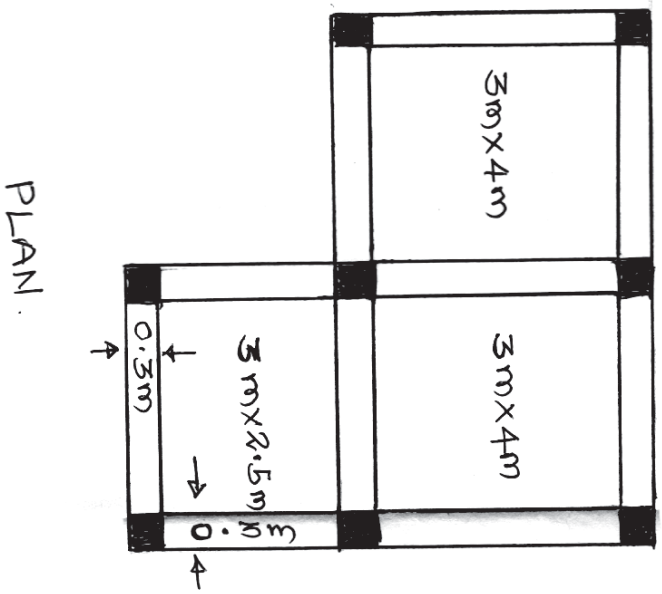
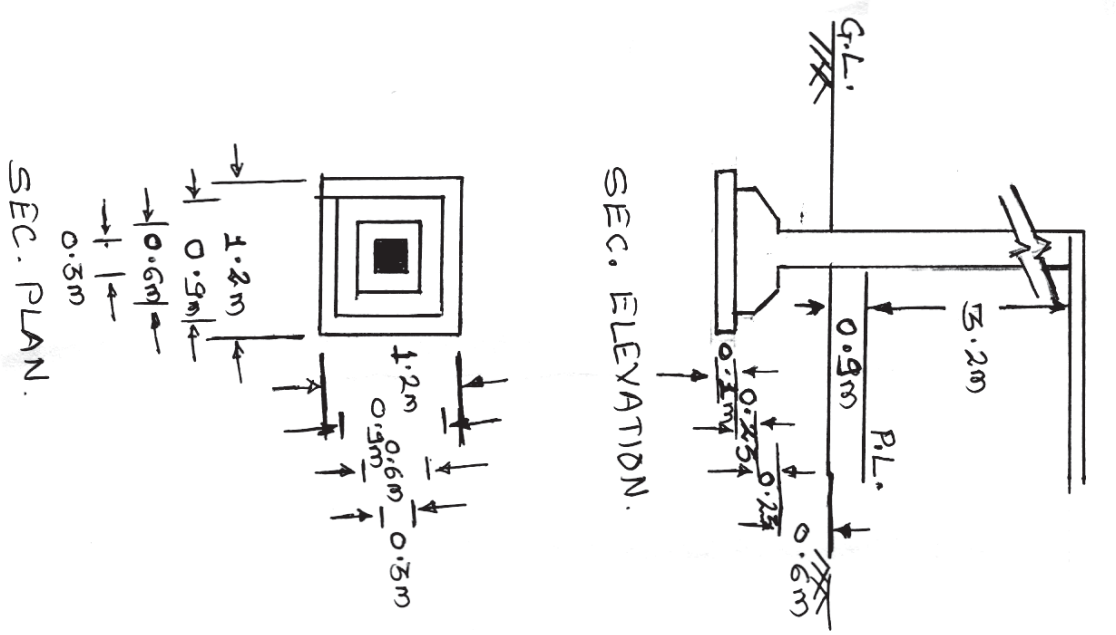


FIG. 01



OR

Q4) a) What is the need for preparing bar bending schedule & what are the content of bar bending schedule table. **[2]**

b) A R.C.C simply supported beam of side 300mm × 650mm is reinforced with 4,20 mm ϕ bars. The main bottom bar are placed in one row of which two are bent up at 45°. Two top anchor bars of 12mm ϕ are provided, and 6mm ϕ stirrup are provided at 150mm c/c. The span of beam is 5.6m and end bearing (both sides) is 30 cm. calculate total quantity of steel reinforcement. **[6]**

Q5) Workout unit rate of the R.C.C work in CCM20 (1:1.5:3). Following rates for material & labour may be assumed. **[6]**

a) Cement = Rs. 300/bag
b) Sand = Rs. 1750/m^3
c) Agreegate = Rs. 800/m^3
d) Steel = Rs. 68,000/MT
e) Head mason = Rs. 950/day
f) Mason = Rs. 700/day
g) Maz door = Rs. 500/day
h) Men & Women = Rs. 350/day

OR

Q6) What is the necessity of drafting specification for Civil engineering work. Explain briefly **[6]**

a) General specification.
b) Detailed specification.

Q7) a) Why do depreciation occur in the valuation of property? What are the different methods of calculating depreciation. Explain any one method of calculating depreciation stating formula used, merits & demerits. **[6]**

b) What are the factors which effect value of a property? Explain **[6]**

i) Salvage value
ii) Book value
iii) Fair market value

c) Explain concept of free hold & lease hold property. What are the reasons under which the property is leased & what are the liabilities of lessor & lesee? **[6]**

OR

Q8) a) The depreciated replacement value of building has to be found out with the following data

i) Total builtup area = 500m^2
ii) Age of building = 25 years
iii) Life of building = 90 years
iv) Scrap value after useful life = 10%
v) Per centage for sinking fund = 5%

Assume rate of construction as Rs. 2000/sq-m **[6]**

b) Explain in brief : **[6]**

i) Sinking fund

ii) Year's purchase

iii) Different form of lease & explaining anyone

c) Under what condition belting method of valuation is used explain in detail the procedure for finding the value of property by belting method. **[6]**

Q9) a) What are the approvals required to be obtained for executing any PWD work & explain the sequential process in such case. **[4]**

b) How are PWD works classified based on the cost of work, nature of work. **[6]**

c) Explain **[6]**

i) Retention Money ii) Interim Payment &

iii) Secured advance

OR

Q10) a) What is meant by a "Tender"? State various method of inviting tenders & explain any one method. **[6]**

b) What is meant by qualification of contractor & what are the types of qualification considered in tending process, explain each type of qualification. **[6]**

c) Explain any two types of tenders & their suitability. **[4]**

Q11) a) Describe Lump sum contract with respect to following : **[8]**

i) Nature of agreement ii) Mode of payment

iii) Suitability iv) Advantages

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

i) Null or void contract ii) Liquidated damages

iii) Security deposit iv) Cost plus contract

OR

Q12) a) What are the different types of arbitration, explain any one type of arbitration. **[6]**

b) Can a contract be terminated & what are the different methods of termination of contract & explain any one method. **[6]**

c) What are the powers & duties of arbitrator? **[4]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

P16

[Total No. of Pages : 2

[5871]-516

B.E. (Civil-Structure)

ADVANCED STRUCTURAL DESIGN

(2015 Pattern) (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. Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figure to the right indicates full marks***
4) ***Assume suitable data, if necessary, and clearly state.***
5) ***All relevant IS code and steel table are allowed in the examination.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) Design a column of the effective length of 2.1m. The design load on the column is 500 kN the yield stress of steel is 240 N/mm^2 **[10]**

OR

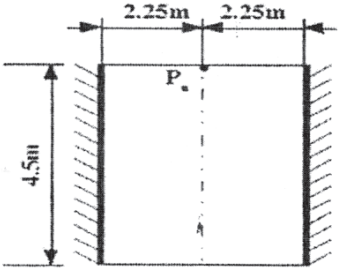
Q2) Explain the design procedure for cold form light gauge tension members. **[10]**

Q3) Explain with a neat sketch how the preliminary dimensions for a steel chimney are worked out. **[10]**

OR

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

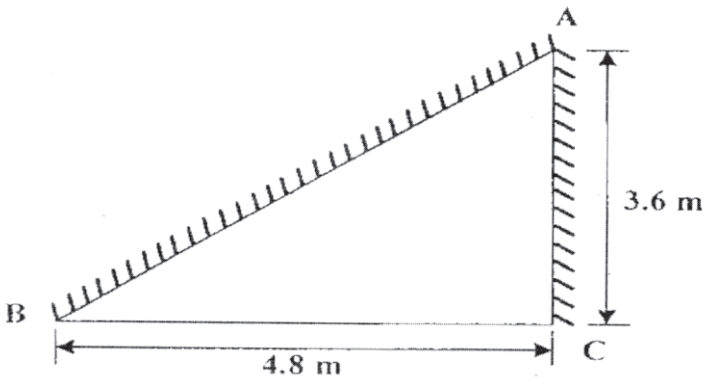
Q5) A square slab of span 4.5 m is simply supported at two opposite sides as shown in Fig.2. The slab carries a uniformly distributed load of $15kN/m^2$. The slab is isotopically reinforced with an ultimate positive moment of resistance of 90 kN-m/m. Calculate the ultimate concentrated load P_u that can be placed at the center of the free edge that would cause a flexural failure.**[16]**



OR

P.T.O.

Q6) Determine the uniformly distributed collapse load for the slab shown in Fig.3 **[16]**



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

OR

Q8) State IS 3370 code provision for water tanks. Write a detailed design procedure for the water tank. **[18]**

Q9) Explain the step-by-step design procedure of an RC shear wall. Also, explain how boundary elements are designed. **[16]**

OR

Q10)a) What are boundary elements in a shear wall? How is load carry capacity calculated. **[8]**

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

● ● ●

Total No. of Questions : 10]

SEAT No. : ____

P17

[Total No. of Pages : 3

[5871]-517
B.E. (Civil)
STATISTICAL ANALYSIS AND COMPUTATIONAL METHODS IN CIVIL ENGINEERING
(2015 Pattern) (Elective -III) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***Assume Suitable data, if necesary.***
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 False Position method and its procedure with a suitable example. **[4]**

b) Evaluate the following by Newton's iteration method: $1/\sqrt{14}$ correct up to four decimal places **[6]**

OR

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

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

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

b) Solve using Gauss Jordan Method, Following set of equations: **[6]**

$x+y+z=9$, $2x-3y+4z=13$, $3x+4y+5z=40$

OR

Q4) a) Write a short note on Gauss Elimination Method **[4]**

b) Apply Gauss Seidel method to solve following set of equations: **[6]**

$x=1/20\ (17-y+2z)$, $y=1/20\ (-18-3x+z)$, $z=1/20(25-2x+3y)$

P.T.O.

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

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

Central Size	15	25	35	45	55	65	75	85
Frequencies	5	9	13	21	20	15	8	3

c) The median and mode of the following wage distribution are known to be Rs. 33.5 and 34 respectively. Three values from the table are however missing. Find these missing values. **[7]**

Wages	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No.of workers	4	16	--	--	--	6	4

OR

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

b) The mean of 5 observations is 4.4 and the variance is 8.24. if the three of the five observations are 1,2 and 6, find the other two. **[6]**

c) Calculate Standard Deviation, from following data. **[6]**

Size of item	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	15	30	53	75	100	110	115	125

Q7) a) A bag contains 8 white and 4red balls. 5 balls are drawn at random Find the probability that 2 of them are red and 3 are white **[4]**

b) A and B play for a prize of Rs. 1000. A is to throw a dice first and is to win if he throws 6. If he fails, B is to throw the dice and is to win if he throws 6 or 5. If he fails, A will throw again and to win if he throws 6,5 or 4 and so on. Find their respective expectations. **[7]**

c) The probability that a contractor will get a plumbing contract is 2/3 and the probability that he will not get an electric contract is 5/9. If the probability of getting at least one contract is 4/5, what is the probability that he will get both the contracts? **[6]**

OR

Q8) a) Explain Chi Square distribution with suitable example **[4]**

b) 8 coins are tossed simultaneously. Find the chance of obtaining. **[6]**

i) At least 6 heads

ii) No heads

iii) All heads

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

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

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

Q9) a) Explain various types of correlation and Karl Pearson's Coefficient of correlation. **[4]**

b) Calculate Karl Pearson's coefficient of correlation from the following data: Arithmetic means of X and Y series are 6 and 8 respectively. **[6]**

X	6	2	10	4	8
Y	9	11	--	8	--

c) Given the following data. **[7]**

X	6	2	10	4	8
Y	9	11	5	8	7

Find the two regression equations and calculate the standard error of the estimate (s_{yx} and s_{xy})

OR

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

b) Calculate regression equations of X on Y and Y on X from the following data and estimate X when Y=26. Calculate coefficient of correlation also. **[7]**

X	10	12	13	17	18	20	24	30
Y	5	6	7	9	13	15	20	21

c) For certain X and Y series which are correlated, the two lines of regression are: $5x-6y+90=0$ and $15x-8y-130=0$. Find the means of the two series and the correlation Coefficients. **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

P18

[Total No. of Pages : 2

[5871]-518
B.E. (Civil)
HYDROPOWER ENGINEERING
(2015 Pattern) (Semester - II) (Elective-III)

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

Instructions to the candidates:

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

Q1) a) Explain environment impact of Thermal p/p on Air, land, Water and green house gas emission. **[5]**

b) With the help of a load duration curve discuss the combined efficiency of a power generation scheme shared by thermal and pumped storage plant. **[5]**

OR

Q2) a) Explain the procedure of determination of hydropotential with help of sketch. **[5]**

b) Write function of components of hydro p/p **[5]**

i) Intake ii) HRT

iii) Fore bay iv) Surge tank

v) Settling basin

Q3) a) Distinguish between Run off hydro power plant and valley dam hydro p/p. Give examples of each. **[5]**

b) What is surge tank? Explain types with help of a neat sketch **[5]**

OR

Q4) a) Explain load forecasting-Need, types, factors on which it depends in context of INDIA. **[5]**

b) What are the advantages and disadvantages of underground hydro p/p. Give 2 examples. **[5]**

P.T.O.

Q5) a) Explain any four electrical equipment's in power house. **[8]**

b) Sketch the details of typical power house and show all components. State functions of all components. **[8]**

OR

Q6) a) What is instrumentation in power house? How instrumentation and control is achieved in case of powerhouse? **[8]**

b) What is underground power station? Explain various ways of locating underground power house in detail. **[8]**

Q7) a) What is power house? Explain any four electrical equipment's in power house **[9]**

b) Define Reaction turbine and Impulse turbine with Example. Differentiate between reaction and impulse turbine. **[9]**

OR

Q8) a) What is draft tube? What are the functions of draft tube? Explain different types with figures and draft tube theory? **[9]**

b) A turbine is to operate under 30 m head at 250 rpm. The discharge is 9 m3/sec. If the efficiency of the turbine is 85% determine, **[9]**

i) Power Generated

ii) Specific Speed

iii) Type of Turbine

iv) Output under the Head of 25 m

Q9) a) What are the provisions related to licensing in case of hydroelectric power generation as per electricity act 2003. **[8]**

b) What are the factors governing the pricing of electricity. **[8]**

OR

Q10)a) Explain the concept of carbon credit? Give its significance. **[8]**

b) What are the duties of electricity generation companies. **[8]**

Total No. of Questions : 10]

SEAT No. :

P19

[Total No. of Pages : 2

[5871]-519
B.E. (Civil)
AIR POLLUTION AND CONTROL
(2015 Pattern) (Semester - II) (Elective-III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right side indicate full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Asume any missing data if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Explain super adiabatic atmospheric condition. **[5]**

b) The emission of SO_2 from a coal fired power plant, at a rate of 1500 g/s. The wind speed is 4 m/s on a sunny afternoon. Determine the effective stack height. Stack parameters : Height=130 m, Diameter = 1.5m, Exit velocity = 12 m/s, Temperature =320 °C, Atmospheric condition, P=100 kPa, T=25 °C. **[5]**

OR

Q2) a) Describe method of ambient air quality analysis for suspended particulate matter. **[5]**

b) What are the devices used for sampling of gases and vapours? Describe any one in detail. **[5]**

Q3) a) Explain sick building syndrome. **[5]**

b) Explain physical and chemical changes in indoor air quality. **[5]**

OR

Q4) a) Explain air cleaning system. **[5]**

b) Write National Ambient Air Quality Standards 2009. **[5]**

P.T.O.

Q5) a) With neat sketch explain the principle, construction and working of cyclone. **[8]**

b) Name and describe three control devices developed in control of automotive emission. **[8]**

OR

Q6) a) A horizontal parallel plate electrostatic precipitator consisting of three gas passages 4.8 m × 4.8 m deep with 30 cm plate spacing is to treat 540m3/min of air. Due to a rapid emission before inlet to the precipitator, the velocity profile is not fully developed. As a result, the volume rate of flow in the middle duct is twice that pf the outer duct. Calculate the collection efficiency. Use migration velocity of 0.8 m/s. **[8]**

b) Explain the principles of scrubber with a neat sketch. What are the advantages and disadvantages of scrubber? **[8]**

Q7) a) Discuss the application of land use planning as a method of air pollution control. **[8]**

b) Explain the economics of air pollution control on the basis of cost/ benefit ratio and optimization. **[8]**

OR

Q8) a) Explain how air pollution due to automobile are controlled. **[8]**

b) What is land use planning and write its importance. **[8]**

Q9) a) Write roles of public and impact assessment agency in the EIA process. **[6]**

b) Write short note on EIA by Matrix method. **[6]**

c) Explain the EIA cycle and procedures. **[6]**

OR

Q10)a) Write the environmental rules 1999 (sitting of industries) as per the notification of Ministry of Environment and Forest. **[9]**

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

Total No. of Questions : 8]

SEAT No. : ____

P20

[Total No. of Pages : 3

[5871]-520

B.E. (Civil)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain plane stress and plane strain elasticity problem with example. Write stress-strain relationship. **[8]**

b) Write advantages, disadvantages and applications of FEM. **[6]**

c) Give two dimensional and three dimensional Pascal's triangle. Explain its use in FEM analysis. **[6]**

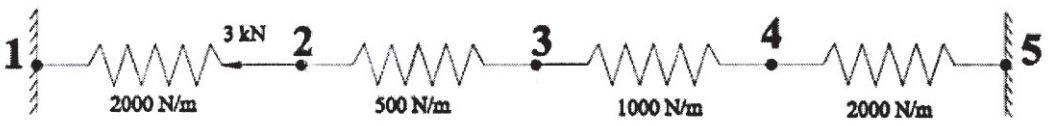
OR

Q2) a) Derive element stiffness matrix for a truss element by using Principle of minimum potential energy. **[8]**

b) Derive strain-displacement relations for 3D elasticity problems. **[6]**

c) State and explain the convergence criteria for the choice of the displacement function in FEM with examples. **[6]**

Q3) a) Determine elongations at each node of the spring assembly as shown in Figure. **[10]**

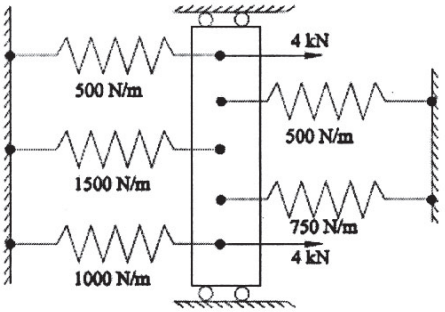


P.T.O.

b) Coordinates of nodes of CST element are node 1 (1, 1, 5), node 2 (4, 3 5), node 3 (3, 6, 5). At interior point P if x = 2.5 and N_2 = 0.4. Find coordinate of point P and values of N_1 and N_3. **[6]**

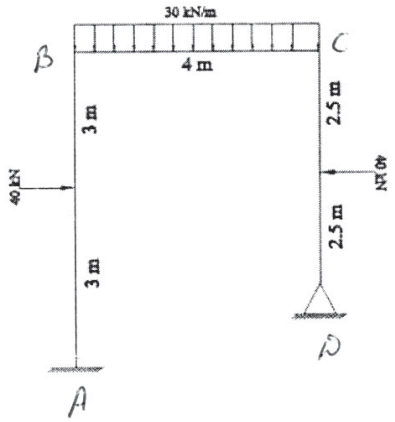
OR

Q4) a) Determine elongations at each node of the spring assembly as shown in Figure. **[10]**



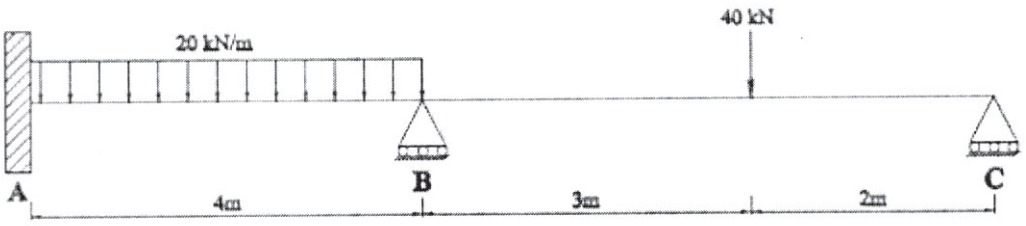
b) Derive the relationship between the natural (area) and Cartesian coordinates of a triangular element. **[6]**

Q5) a) Analyze the portal frame ABCD as shown in Figure using finite element method. Neglect axial deformation. Take EI constant. **[16]**



OR

Q6) a) Analyse the continuous beam ABC as shown in figure using finite element method. Take EI constant. **[16]**



Q7) a) Derive the Jacobian matrix for the four noded quadrilateral isoparametric element having Cartesian coordinates at node 1 (5.0, 2.0), node 2 (8.0, 3.0), node 3 (9.0, 6.5) and node 4 (3.5, 4.5). **[10]**

b) Derive shape functions of eight noded serendipity element. **[8]**

OR

Q8) a) Derive the element stiffness matrix for plane stress constant strain triangular (CST) element and show that sum of shape functions is equal to unity. **[10]**

b) Derive shape functions for the nine noded rectangular elements in natural coordinate (ξ, η) system using Lagrange's interpolation function. **[8]**

Total No. of Questions : 10]

SEAT No. : [ ]

P21

[Total No. of Pages : 3

[5871]-521

B.E. (Civil)

AIRPORT AND BRIDGE ENGINEERING

(2015 Pattern) (Semester - II) (Elective - III)

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) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume necessary data.***
5) ***Use of scientific calculators is allowed.***

Q1) a) Describe the method of plotting wind rose diagram showing direction, duration and Intensity of wind to fix the orientation of runway in an Airport. **[6]**

b) What are the characteristics Aircraft? **[4]**

OR

Q2) a) Discuss the following : **[6]**

i) Apron turntable

ii) Hanger site locations.

b) What is Air traffic control Network system? **[4]**

Q3) a) What are the roles and responsibilities of ICAO and FAA? **[6]**

b) What is Normal Approach and Landing? **[4]**

OR

Q4) a) The length of the runway under the Standard condition is 1600 m. The airport site has an Elevation of 320m. And the reference temperature of the airport is 33.60°C. It is decoded to construct the runway with can effective Gradient of 0.25%. Determine the Corrected length of the Runway. **[6]**

b) What are the Characteristics of good airport layout. **[4]**

P.T.O.

Q5) a) What steps are necessary to develop a heliport? **[5]**

b) With suitable sketch explain the Approach Lighting System of heliport. **[6]**

c) With suitable sketch discuss the Tie-down Configuration. **[5]**

OR

Q6) a) What is VTOL? Are there different types of VTOL? **[5]**

b) Write note on the following : **[6]**

i) Hovering Flight

ii) Vertical Flight

iii) Forward Flight

c) What are the factors that influence the choice of bridge super structure? **[5]**

Q7) a) The catchment area of a stream is of sandy soil with light vegetation cover and the area of the catchment is 12000 hectare. The length of the catchment is 25 km and the fall in level from critical point to the bridge site is 180 m. Calculate the peak runoff for designing the bridge. The rainfall in 4 hours is recorded 18 cm. Area factor = 0.70 and coefficient to account for losses due to absorption = 0.20. **[6]**

b) What are the forces acting on abutment? **[4]**

c) Differentiate the followings - **[6]**

i) U- abutment and T- abutment

ii) Pile bent and trestle bent

OR

Q8) a) What is the classification of bridges according to - **[6]**

i) Road engineers

ii) Indian Railways

b) The flood discharge under a bridge is 750 m^3/sec. The bridge site is at right angled bend. Assuming Lacey's silt factor for river bed as 0.85, calculate the maximum scour depth. **[5]**

c) What are the different forces acting on components of a bridge? **[5]**

Q9) a) What are the functions of bearings in bridges? **[6]**

b) Define the causeway and describe its types. **[6]**

c) Why the cantilever bridges are more suitable for long spans and deep valleys? **[6]**

OR

Q10)a) Why the cable stayed decks are less prone to the wind induced oscillations than the suspension bridges. **[6]**

b) Define temporary bridge and mention the materials and fastenings employed in its construction. **[6]**

c) Write brief notes on following : **[6]**

i) Neoprene bridge bearing

ii) Rubber bearing

Total No. of Questions : 10]

SEAT No. :

P22

[Total No. of Pages : 2

[5871]-522

B.E. (Civil Engineering)

CONSTRUCTION MANAGEMENT

(2015 Pattern) (Semester - II) (Elective - IV) (401010 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.***
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 Infrastructure development in economic development of country. **[5]**

b) Explain scheduling and importance of scheduling. **[5]**

OR

Q2) a) Write short note on time and motion study. **[5]**

b) Comment of project investment opportunities. **[5]**

Q3) a) Explain workmen compensation Act 1923. **[5]**

b) Explain the appointment process of PMC. **[5]**

OR

Q4) a) Write short note on profit and loss statement. **[5]**

b) Explain work study and work measurement. **[5]**

Q5) a) Explain Simulation analysis along with suitable example. **[8]**

b) Explain value engineering and value analysis. **[8]**

OR

Q6) a) What are the different mathematical models used in risk management. **[8]**

b) Explain the role of insurance in risk management. **[8]**

P.T.O.

Q7) a) Write short note on: Performance appraisal and Job evaluation. **[8]**

b) Explain the Human resource management system. **[8]**

OR

Q8) a) What is EOQ, explain with suitable example. **[8]**

b) Write short note on Vendor networking and buyer supplier relationship. **[8]**

Q9) a) What are the applications of Genetic algorithm? **[10]**

b) Explain Biological neural network. **[8]**

OR

Q10)a) What is ANN? Explain with suitable example. **[10]**

b) Explain fuzzy logic in detail. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P23

[Total No. of Pages : 3

[5871]-523

B.E. (Civil)

ADVANCED TRANSPORTATION ENGINEERING

(2015 Pattern) (Semester - II) (401010B) (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) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data if necessary.***
5) ***Use of scientific calculators is allowed.***

Q1) a) During a traffic survey the following data was recorded on a road network:
Two wheelers - 2000
Cars - 800
Buses - 500
Auto - 350 and Cycle -100
Determine PCU using IRC 106-1990. **[6]**

b) Write a note on the concept of Hyper loop **[4]**

OR

Q2) a) How does Intelligent Transportation System (ITS) help in traffic management of the city? **[6]**

b) State the need and objectives of Traffic System Management. **[4]**

Q3) a) How is the Home interview survey done and state its advantage over other types of surveys. **[6]**

b) What is road user cost? Why it is important? **[4]**

OR

Q4) a) Answer the followings : **[6]**

i) What is value of travel time?
ii) What is running cost?
iii) What is road damage cost?

b) Explain the role of ITS in traffic management. **[4]**

P.T.O.

Q5) a) What will be theoretical maximum capacity (to nearest 10 units) for a single lane of highways given that the speed of the traffic stream is 40km/hr. **[6]**

b) What is the process for a traffic study? **[4]**

c) With suitable sketches discuss the followings. **[6]**

i) Rotary Intersection

ii) Cloverleaf Interchange

OR

Q6) a) Calculate the theoretical capacity (C) of a traffic lane with one-way traffic flow for the given data. **[5]**

i) Traffic flow at a stream speed = 40 kmph

ii) Average centre to centre spacing of vehicles = 12.8 mtrs

b) What is the important provisions are made for bicycle and pedestrian facilities? **[6]**

c) What are the adhering principles on which traffic studies should be conducted? **[5]**

Q7) a) What are the factors to be considered for the design of flexible pavements? Discuss significance of each? **[6]**

b) Describe the various maintenance strategy to be carried out for flexible pavements. **[4]**

c) Explain with sketches any 8 types of distresses occurring in flexible pavements, their reasons and how they are measured. Explain PCR and its importance, with an example. **[6]**

OR

Q8) a) How is the design traffic computed during the design of flexible pavements? **[6]**

b) Draw a typical cross-section showing all the basic layers of flexible pavement. **[4]**

c) With reference to Benkelman beam deflection study, explain. Correction for pavement temperature. Correction for seasonal variation in subgrade moisture content. **[6]**

Q9) a) Explain the severity levels and extent level of distress in rigid pavements with the help of an example. **[6]**

b) Compare the Flexible Pavement and Rigid Pavement **[6]**

c) A cement concrete pavement of thickness 18 cm, has two lanes of 7.2 m with a joint.

Design the tie bars. Data:

Thickness - h = 18 cm,

Allowable Tensile Stress - Ss - 1700kg/cm^2

Unit weight of Concrete - W - 2400 kg/cm^2

Allowable Bond Stress - Sb -24.6 kg/cm^2

Coefficient of Friction - f = 1.5

Width of Panel - b = 7.2/2 = 3.6 m. **[6]**

OR

Q10) a) What are the failure criteria of rigid pavement? **[6]**

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

c) Determine the stresses at interior, edge and corner regions of a cement concrete pavement using Westergaard's stress equations. Use the following data:

Wheel load, P = 5200 Kg

Modulus of elasticity of cement concrete, E = 3.0 × 105 kg/cm^2

Pavement thickness, h = 18 cm

Poisson's ratio of concrete, μ = 0.15

Modulus of subgrade reaction, K = 6.0 kg/cm^3

Radius of contact area, a = 15cm

[6]

Total No. of Questions : 12]

SEAT No. :

P24

[Total No. of Pages : 2

[5871]-524

B.E. (Civil Engineering)

ADVANCED FOUNDATION ENGINEERING

(2015 Pattern) (Semester - II) (Elective - IV) (401010C)

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

Instructions to the candidates:

1) ***Answer 1 or 2, 3 or 4, 5 or 6, 7 or 8, 9 or 10, 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 and mention it clearly..***
5) ***Use of non-programmable calculator is allowed.***

Q1) a) Explain the seismic refraction method based on given points. **[3]**

i) Principle.

ii) Procedure.

iii) Assumptions.

b) Explain the planning of subsoil exploration in geotechnical investigation. **[3]**

OR

Q2) a) Explain the IRC provision for exploration of roads. **[3]**

b) Give brief about spacing and lateral extent of boring in subsoil exploration subjected to various types of structures. **[3]**

Q3) a) Explain the friction piles and bearing piles. **[3]**

b) Explain the winkler's assumption for laterally loaded piles. **[3]**

OR

Q4) a) How the allowable load for under test is determined in a cyclic pile load test. **[3]**

b) What do you mean by laterally loaded piles? How modulus of subgrade reaction and relative stiffness is determined in laterally loaded piles? **[3]**

Q5) a) What are the IS code recommendations for design of under reamed pile foundations? **[4]**

b) Describe the Limiting Frictional Approach for tensile analysis of under reamed piles. **[4]**

OR

Q6) a) What are the salient features of stone column treatment? **[4]**

b) Discuss soil improvement using granular drainage blanket. **[4]**

P.T.O.

Q7) a) What are the effects of eccentric loading on shallow foundation? **[6]**

b) List out the software used for the design of foundations, along with their parameters. **[6]**

c) Describe the construction process of raft foundation. **[4]**

OR

Q8) a) Describe elastic method of raft foundation design along with IS Code provisions. **[6]**

b) Discuss the important criteria for deciding depth of footings. **[6]**

c) What are the computational methods for geotechnical foundation design? **[4]**

Q9) a) Discuss the different shapes of cross-sections of wells used in practice, giving the merits and demerits of each. **[6]**

b) Write a short note on failure of well foundation. **[6]**

c) Explain in detail, why rockfill coffer dams are preffered over earthen coffer dams? **[4]**

OR

Q10) a) With neat sketch, explain the elements of a well foundation. **[6]**

b) State the merits and demerits of rockfill coffer dams. **[6]**

c) Briefly explain the necessity of cofferdams. **[4]**

Q11) a) Describe the stress distribution in the tunnels. **[6]**

b) Write a note on positive projecting conduits. **[6]**

c) What is rigid ditch conduit. Explain how load on a rigid ditch conduit is evaluated. **[6]**

OR

Q12) a) Classify conduits. Explain any one in detail. **[6]**

b) Write a short note on 'Imperfect ditch conduit and evaluation of load on imperfect ditch conduit. **[6]**

c) State and explain various purposes referring to the conduits. Which are laid underground. **[6]**

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Total No. of Questions : 12]

SEAT No. :

P25

[Total No. of Pages : 2

[5871]-525

B.E. (Civil)

COASTAL ENGINEERING

(2015 Pattern) (Semester - II) (Elective-IV) (401010 D)

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 and mention it dearly.***
5) ***Use of non-programmble calculator is allowed.***

Q1) a) Write short note on classification of ocean waves. **[3]**

b) Enlist assumptions made in wave theories. **[3]**

OR

Q2) a) Write short note on tide producing forces-earth moon and earth sun system. **[3]**

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

Q3) a) Explain the process of tidal power generation in short. **[3]**

b) Explain the Coastal process-Erosion/accretion due to waves, bed forms, long shore transport. **[3]**

OR

Q4) a) Distinguish between tides in rivers-estuaries and tides in shallow sea. **[3]**

b) Write assumptions in tidal theory. **[3]**

Q5) a) Enlist different factors affecting the littoral process. **[4]**

b) What are different bed forms and their characteristics? **[4]**

OR

Q6) a) What are the effects of high tides on stability of inlets? **[4]**

b) What is wave induced sediment? Enlist any two effects of such sediment on shoreline. **[4]**

P.T.O.

Q7) a) Write a note on Rubble mound jetties. Draw neat diagram. **[8]**

b) What are revetments? Why the revetments are provided? Classify the revetments on functional basis. **[8]**

OR

Q8) a) Draw neat diagram of curved face sea wall and explain in depth. **[8]**

b) Explain in detail any four types of dredgers. **[8]**

Q9) a) Write on design of disposal methods of dredged materials and Environmental aspect of dredging. **[8]**

b) Enlist different feasibility criteria of dumping ground for dredged materials. **[8]**

OR

Q10)a) Explain the necessity of dredging in coastal zones. Explain any one method of disposal of dredged materials. **[8]**

b) Explain various environmental aspects of dredging with good effects and bad effects. **[8]**

Q11)a) What are the design criteria for coastal outfall systems? Write a detail note on "pollution in Coastal zone". **[8]**

b) What are the different methods for disposal of waste (dredged spoils) in coastal zone. **[10]**

OR

Q12)a) Explain the necessity to regulate the coastal zone. How coastal area is regulated in different zones? What are the different factors affecting the growth of coastal zone considering to regulate the space as criterion and pollution as criterion. **[8]**

b) Explain in detail any case study of oil spill to quantify its effects on coastsal ecosystem. **[10]**

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Total No. of Questions : 10]

SEAT No. :

P26

[Total No. of Pages : 2

[5871]-526

B.E. (Civil)

PLUMBING ENGINEERING

(2015 Pattern) (Semester - II) (Elective - IV) (Open Elective) (401010 EA)

Time : 2.½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Translate the role of Plumber. **[6]**

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

OR

Q2) a) Define Plumbing and state the job of Plumbing Consultant. **[5]**

b) Explain GPCS-I **[5]**

Q3) a) Contrast One pipe and Two Pipe system. **[5]**

b) Relate CPVC and Rigid PVC Pipes. **[5]**

OR

Q4) a) Explain Stainless steel pipes in plumbing Industry and State its Advantages. **[5]**

b) Explain Urinals with Sketch? **[5]**

Q5) a) Explain horizontal wet vent and vertical wet vent with neat sketches. **[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.

OR

Q6) a) Explain Purpose of trap and State its types with Suitability. **[10]**

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

i) Oil Interceptors.

ii) Sand Interceptors.

P.T.O.

Q7) a) Explain sizing of house drain and sizing of its vent pipe. **[8]**

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

i) Septic tank.

ii) Gully Trap.

OR

Q8) a) Explain drainage air test and drainage water test procedure. **[8]**

b) Explain types of building sewer pipes with its suitability. **[8]**

Q9) a) Explain design of plumbing system for multi-story Building. **[8]**

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

OR

Q10)a) Explain High rise building and Multi-story tanks. **[8]**

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

i) Pressure Reducing valves.

ii) Plumbing Shafts.

Total No. of Questions : 8]

SEAT No. : ____

P27

[Total No. of Pages : 2

[5871]-527

B.E. (Civil)

GREEN BUILDING TECHNOLOGY

(Semester - II) (2015 Pattern) (Open Elective) (401010 EB)

Time : 2.½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Elaborate need of Ecofriendly materials for external and internal components in construction? Give appropriate examples. **[7]**

b) What is the meaning of building envelope and climate responsive architecture? What is the relation? **[7]**

c) Explain the importance of "Energy Management". Explain by giving examples of current practices in construction industry. **[6]**

OR

Q2) a) What role is played by Government in "Construction Waste Management". **[6]**

b) Write a note on Air Movement and its impact on means of thermal comfort. **[7]**

c) What is Embodied Energy? Mention its significance for any construction project. **[7]**

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

b) Explain the importance of , "Wind energy" in relation with today's scenario. **[9]**

OR

Q4) a) What is the importance of Biogas generation? Elaborate in relation with today's context of urban and rural areas. **[8]**

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

P.T.O.

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

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

OR

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

b) Explain various stages under CDM. **[9]**

Q7) a) Compare and contrast between following rating systems: "LEED and CASBEE". **[8]**

b) What advantages are given to, "Rated Buildings" by Urban Local Bodies. **[8]**

OR

Q8) a) Explain in detail, "NAHB" rating system. **[8]**

b) What is rated building? Explain ANY ONE case study of rated building. **[8]**

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

P28 **[Total No. of Pages : 2**

[5871]-528

B.E. (Civil)

FERROCEMENT TECHNOLOGY

(2015 Pattern) (Semester - II) (401010 EC) (Open Elective)

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, Q.No.9 or Q.No.10, Q.No.11 or Q.No.12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) Give the advantages and disadvantages of ferrocement structures over RC structures. **[6]**

OR

Q2) Enlist and Explain special types of Ferrocement. **[6]**

Q3) a) How to test Ferrocement? **[3]**

b) What are the properties of ferrocement under static and dynamic loading. **[5]**

OR

Q4) a) Write a note on specific surface method and crack control method. **[3]**

b) Enlist different conventional design methods applied to ferrocement and explain the design based on equivalent area method for compression, tension, and flexural members. **[5]**

Q5) Write a note on conventional design methods like working stress and load factor applied to ferrocement. **[6]**

OR

Q6) Discuss in detail specific surface method and crack control method in design of ferrocement structure. **[6]**

Q7) a) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. **[8]**

b) Explain the design and construction of houses with following ferrocement building accessories: cavity walls, hollow floors, hollow beams, staircases and other building accessories. **[9]**

OR

P.T.O.

Q8) a) Write a note on 'Design and Construction of earthquake resisting structures' **[8]**

b) Draw the neat sketches of various structural forms & Also give the comparative study of behavior forms in respect of strength and design parameters with ferrocement technology. **[9]**

Q9) a) Why to use ferrocement in hydraulic structures? Enlist various applications of ferrocement with respect to hydraulic structures? Explain any one in detail. **[8]**

b) Explain the special techniques to resist shocks of ferrocement structures affected during earthquake. **[8]**

OR

Q10)a) Enlist and explain factors governing cost and value of ferrocement in building constructions. Also compare cost of ferrocement structures with conventional structures. **[8]**

b) What are various types of retaining wall? Compare conventional retaining wall with ferrocement arch faced wall. **[8]**

Q11)a) Write a note on:
Ferrocement precast walling and flooring panels. **[7]**

b) Explain in detail the industrial precast ferrocement concrete elements you seen with: **[10]**

i) Raw materials of construction
ii) Analysis and design principles
iii) Manufacturing process
iv) Testing methodology and quality control.

OR

Q12)a) Enlist and explain joints in precast ferrocement elements. **[4]**

b) Explain ferrocement in precasting with respect to **[6]**

i) method of precasting
ii) design of precast element
iii) application of precast ferrocement.

c) Why ferrocement is used for precasting? Give the different methods of ferrocement precasting and Explain any one in detail. **[7]**

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Total No. of Questions : 08] **SEAT No. :**

P29 **[Total No. of Pages : 3**

[5871]-529
B.E. (Civil Engineering)
SUB SEA ENGINEERING
(2015 Pattern) (401010 ED) (Semester - II) (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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Discuss the influence of wave, wind, tide and current on marine operations. **[6]**

b) Summarize the current state of the art methods for infrastructure development of Oil and Gas industry. **[6]**

c) Discuss the main intervention methods including AUVs, ROVs and divers. **[6]**

OR

Q2) a) Discuss the general view of oil and gas industry, technological challenges and future developments. **[6]**

b) Discuss how the water depth influences the architecture of any structure which is to be constructed in the sub sea region. **[6]**

c) Elaborate in detail flow assurance issues like paraffin depositon; hydrate formation and blockage; Asphaltene precipitation and general procedures to resolves these issues. **[6]**

Q3) a) Elaborate in detail present and future challenges in the data Management Construction of oil industries in the subsea zone. **[6]**

b) Discuss in detail the HAZOPS system for subsea construction works related to oil industries. **[6]**

c) Differentiate between the shallow and deep sea methods of investigation and monitoring of different construction works. **[6]**

OR

P.T.O.

Q4) a) What are the Reliability and integrity management issues in the oil industry and gas industry constructions in the subsea region? Discuss one by one in short. **[6]**

b) Discuss in detail the FMECA system for subsea construction works related to oil industries. **[6]**

c) Write a short note on reliability and risk Assessment in the development of subsea construction works. **[6]**

Q5) a) How subsea field equipment, structures and architectures are dependent on each other with respect to the scale of operations and environmental factors? **[6]**

b) Which are the different pipeline materials are useful in the construction works for gas industry specifically in the subsea region? And explain their chemical compositions suitable for the non-corrosion conditions in the subsea region. **[5]**

c) Enlist different precautionary measures to reduce the corrosion in the oilfield industries and explain any two of them in detail. **[6]**

OR

Q6) a) Give a detail description flow lines, risers, moorings and their role in subsea infrastructure development. **[6]**

b) Criticize each of the pieces of the subsea infrastructure, its use and its interconnection with subsea trees, flow lines and how it effects on the development of subsea infrastructures? **[5]**

c) Explain in depth the various types of corrosion found in the oilfield with emphasis on the effects of acid gases (Co_2 and H_2S) **[6]**

Q7) a) What are the deep water risers? What is their use? Explain different design options available for deep water risers and define the key design drivers for each. **[6]**

b) Compare the two design methods of pipelines that address stress analysis, buckling and collapse of deep water pipelines. **[5]**

c) Discuss the general principles of stress analysis in the main pipe line designing. **[6]**

OR

Q8) a) What are the different technical challenges for the design of main pipeline in deep water and how these challenges should be handled in specific cases? **[6]**

b) Write the step wise procedure for Limit state based design method for pipelines in the subsea region. **[5]**

c) Intricate in detail the geotechnical aspects of pipeline design and its installation. **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

P30

[Total No. of Pages : 2

[5871]-530
B.E. (Civil)
GEOINFORMATICS
(2015 Pattern) (Semester - II) (Open Elective) (401010EE)

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

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3or Q.No.4, Q.No.5, or Q. No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write short note on segments and errors in GPS. **[4]**

b) What is GIS? Explain in detail its components. **[6]**

OR

Q2) a) Explain why raster model is well suited for spatially continuous variables giving suitable examples. **[4]**

b) What is remote sensing? What are the stages of Remote Sensing. **[6]**

Q3) a) Explain in detail the supervised classification technique employed in Digital Image Processing (DIP) **[4]**

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

i) Thermal Remote Sensing

ii) Microwave Remote Sensing.

OR

Q4) a) Explain in brief, Hardware and Software requirement in GIS. **[4]**

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

i) image enhancement

ii) image classification

iii) Object recognition

P.T.O.

Q5) a) Write short note on WEB Mapping Architecture and components. **[6]**

b) Comment on, GRASS as an open source GIS **[6]**

c) Write short note on Intersecting and clipping vector maps. **[6]**

OR

Q6) a) Comment on, QGIS as an open source GIS. **[6]**

b) Explain Raster data transformation and interpolation using GRASS. **[6]**

c) Write short note on Raster handling and Image analysis. **[6]**

Q7) a) Write short note on Map Resolutions. **[6]**

b) What is a Map? Explain different types of Map Projection systems and its need. **[6]**

c) Write short note Map co-ordinate systems. **[4]**

OR

Q8) a) Describe various geometric characteristics of an aerial photograph and explain the methods of measurement of scale and height on an aerial photograph. **[6]**

b) Write notes on: **[6]**

i) Map features.

ii) Map scale and its importance.

c) Comment on projections for hemispheres and the world maps. **[4]**

Q9) a) Define Geodesy, explain Problem and purpose of Geodesy **[6]**

b) Explain the Relationship between Radius of curvature in the meridian & prime vertical. **[6]**

c) Write short note on Reference Surfaces and their relationship. **[4]**

OR

Q10)a) Differentiate between Three-dimesnsional geodesy and Four- dimensional geodesy. **[6]**

b) Write short note on Historical development and Organization of Geodesy. **[6]**

c) Write properties of Geodesy. **[4]**

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Total No. of Questions : 08]

SEAT No. : ____

P31

[Total No. of Pages : 2

[5871]-531
B.E. (Civil Engineering)
REPAIRS AND REHABILITATION OF CONCRETE STRUCTURES
(2015 Pattern) (Semester-II) (401010EF) (Open Elective)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of non programmoble calculater is allowed.***
5) ***Assume suitrie data, if necessary.***

Q1) a) Explain mechanical action causing deterioration of concrete structures. **[7]**

b) Discuss non-destructive techniques for determination of concrete properties. **[7]**

c) Explain solar reflective coatings. **[6]**

OR

Q2) a) Discuss in brief chloride induced corrosion. **[6]**

b) Explain concrete endoscopy and its significance. **[7]**

c) Write note on moisture barrier system for super structure. **[7]**

Q3) a) Discuss methods of crack repair and patch repair in detail. **[8]**

b) Discuss seismic strengthening of existing RC structures. **[9]**

OR

Q4) a) Discuss in detail **[8]**

i) Polymer modified concrete

ii) Shortcreting

b) Discuss Restoration of heritage structures **[9]**

P.T.O.

Q5) a) Explain repair methodology for underwater structures. **[8]**

b) Discuss repair methods and materials for corrosion of reinforcement **[8]**

OR

Q6) a) Discuss 'corrosion of Reinforcement' in details. **[8]**

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

Q7) a) Write note on Retrofitting of structures using Fiber Reinforced polymers **[9]**

b) Discuss Retrofitting of RC columns using Fiber Reinforced polymers. **[8]**

OR

Q8) a) Discuss Retrofitting w.r.t following **[9]**

i) Significance

ii) Methods

b) Discuss Retrofitting of Beams (RC) using Fiber Reinforced polymers **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P32

[Total No. of Pages : 4

[5871]-532
B.E. (Mechanical)
HYDRAULICS AND PNEUMATICS
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q. No.1 or Q. No.2, Q. No.3 or Q. No.4, Q. No.5 or Q. No.6, Q. No.7 or Q. No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figure to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) List six fields of applications where hydraulics and pneumatics can be used more Effectively than the other power sources. **[6]**

b) What do you understand from power unit explain any one accessories used in fluid power system. **[6]**

c) The displacement of a pump operating at 1000 RPM at a pressure of 10 bar is 100 cm^3. The input torque from the prime mover is 120Nm. If it delivers 0.0015 m3/s of oil, determine :

i) Overall efficiency of the pump.

ii) Theoretical torque required to operate through pump.

iii) Volumetric efficiency.

[8]

OR

Q2) a) Explain the application of accumulator as :

i) A power saving device.

ii) Hydraulic shock absorber device

iii) A leakage compensator. **[6]**

b) An 8 cm diameter hydraulic cylinder has a 4cm diameter rod. If the cylinder receives flow at 100 LPM and 12 MPa, find the actuator speed and load carrying capacity in : **[6]**

i) Extension stroke.

ii) Retraction stroke.

c) What is cushioning of cylinders? Explain with neat sketch with symbolic representation of both sides cushioning of hydraulic cylinder. **[8]**

P.T.O.

Q3) a) Compare the characteristics of tandem centre, close centre and open centre direction control valves. What are their typical applications? **[6]**

b) What is the purpose of providing pilot operated check valve in hydraulic circuit. Explain in short a typical application of pilot operated check valve. **[6]**

c) Draw the pump unloading circuit and explain it's working. **[6]**

OR

Q4) a) Explain sequencing circuit for following conditions. **[6]**

i) Clamp the work piece

ii) Drill the work piece

iii) Remove the drill

iv) Unclamp the work piece

b) What is the purpose of a flow control valve? And classify the flow control valve. **[6]**

c) Draw and explain locked hydraulic cylinder circuit using pilot check valve. **[6]**

Q5) a) Explain with a neat sketch Fail Safe Circuit with overload protection. **[6]**

b) Draw a pneumatic circuit equivalent to OR gate. **[6]**

c) What is the time delay valve draws its ISO symbol. **[4]**

OR

Q6) a) Draw and explain pressure regulator in pneumatic system. **[6]**

b) Draw a typical hydraulic motor braking system. **[6]**

c) Draw the fast approach and slow traverse circuit in hydraulics system. **[4]**

Q7) A machine has two slides 'A' and 'B' which are to be operated hydraulically. The cylinder 'A' has a load of 10 KN and a stroke of 50 cm to be completed in 20 sec. The cylinder 'B' has to overcome a load of 15 KN and has a stroke of 50 cm to be complete in 29 sec. The two cylinders are to be moved simultaneously. They are to be retracted as soon as they reach the end position. The loads during returns, strokes are 5 KN and 3.5 KN respectively. Individual direction control valves are provided for the two cylinders. Draw a suitable circuit to achieve this requirement. Select different components you have used in the circuit from the given data mention the rating of the components in case it is not available in the given data. Assume reasonable values of data in case if it is not provided in the problems (Discuss functional approach, strength approach and selection approach along with suitable circuit diagram). **[16]**

OR

Q8) Two identical cylinders A and B are to be operated simultaneously. The cylinder A moves against a load of 25 KN while the cylinder B has a load of 20 KN. Both the cylinders have a stroke of 1 m. The working stroke is to be completed in about 20 seconds time. The return stroke of cylinder B is to start only after the cylinder A is completely retracted. The return speeds are to be as fast as possible. Draw a circuit which will fulfill these requirements. Select different components you have used in the circuit from the given data mention the rating of the components in case it is not available in the given data. Assume reasonable values of data in case if it is not provided in the problems (Discuss functional approach, strength approach and selection approach along with suitable circuit diagram). **[16]**

DATA

1. Suction Strainer :

Model	Flow Capacity (/pm)
S_1	38
S_2	76
S_3	152

2. Pressure Gauge :

Model	Range (bar)
PG_1	0 - 25
PG_2	0 - 40
PG_3	0 -100
PG_4	0 - 160

3. Vane Pump :

Model	Delivery in / pm		
	at 0 bar	at 35 bar	at 70 bar
P_1	8.5	7.1	5.3
P_2	12.9	11.4	9.5
P_3	17.6	16.1	14.3
P_4	25.1	23.8	22.4
P_5	39.0	37.5	35.6

4. Relief Valve :

Model	Flow capacity (/ pm)	Max Working Pressure & bar
R_1	11.4	70
R_2	19	210
R_3	30.4	70
R_4	57	105

5. Flow control Valve :

Model	Working Pressure (bar)	Flow Range (/pm)
F_1	70	0-4.1
F_2	105	0-4.9
F_3	105	0-16.3
F_4	70	0-24.6

6. Directional Control Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
D_1	350	19
D_2	210	38
D_3	210	76

7. Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
C_1	210	15.2
C_2	210	30.4
C_3	210	76

8. Pilot Operated Check Valve :

Model	Max working Pressure (bar)	Flow Capacity (/pm)
PO_1	210	19
PO_2	210	38
PO_3	210	76

9. Cylinder-(Max Working Pressure-210 bar)

Model	Bore dia. (mm.)	Rod dia (mm)
A_1	25	12.5
A_2	40	16
A_3	50	35
A_4	75	45
A_5	100	50

10. Oil Reservoirs :

Model	Capacity (litres)
T_1	40
T_2	100
T_3	250
T_4	400
T_5	600

Total No. of Questions : 10]

SEAT No. : ____

P33

[Total No. of Pages : 3

[5871] - 533
B.E. (Mechanical)
CAD/CAM & AUTOMATION
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Explain Cubic spline curve with neat sketch. **[4]**

b) Write homogeneous transformation matrix for mirror a line AB about line $x=y$, Where $A(x_1, y_1)$ and $B(x_2, y_2)$ with suitable neat sketch. **[6]**

OR

Q2) The end points of line AB are A(0,0,0) and B(5,5,0) and line *PQ* are *P*(1,1,0) and *Q*(4,5,0). Determine:

i) Parametric equation of line *AB & PQ* **[4]**

ii) The unit vectors of line *AB & PQ* **[2]**

iii) Check, lines *AB & PQ* are parallel or not? **[2]**

iv) Check, lines *AB & PQ* are perpendicular or not? **[2]**

Q3) a) Explain the elimination approach used in FEA. **[4]**

b) Explain shape function in two noded bar element. **[6]**

OR

P.T.O.

Q4) An axial stepped bar as shown in Figure 1, is axially loaded by force P=20kN. Determine nodal displacement, reaction forces and stress in each element. **[10]**

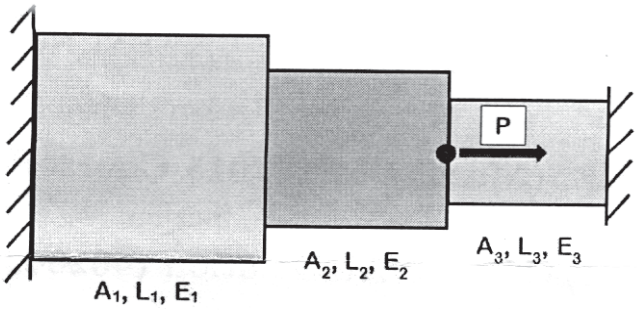


Figure 1:

i) E_1= 2.0G Pa, A_1=200mm^2 and L_1=200mm

ii) E_2 = 1.5G Pa, A_2=150mm^2 and L_2=200mm

iii) E_3 = 1.0G Pa, A_3=100mm^2 and L_3=200mm

Q5) a) Explain circular CW and circular CCW interpolation with G code word address format. **[4]**

b) Write CNC part programming for machining slot with 8 mm diameter end milling cutter as shown in figure 2 in MS plate of 100mm x 200mm x 25mm thick plate. Assume suitable cutting data. **[12]**

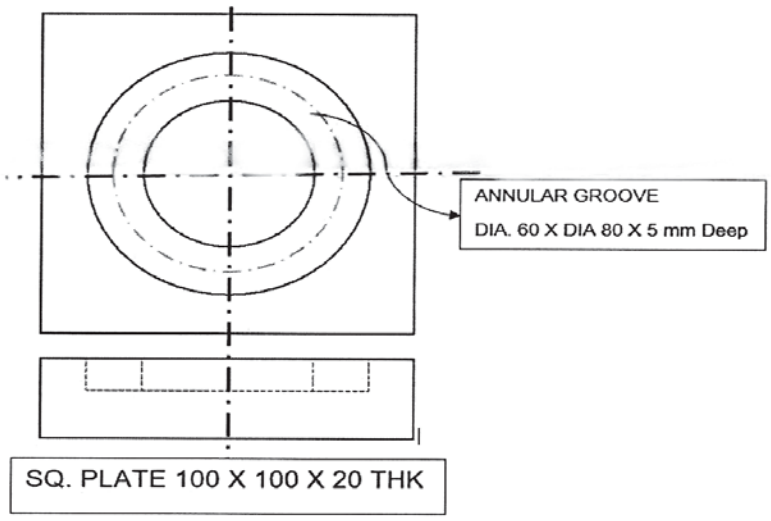


Figure 2: Qu 5(b)

OR

Q6) Write CNC part program for turned component as shown in figure 3 using canned cycles from MS bar of ϕ50. Assume suitable cutting data and dimensions, if required. **[16]**

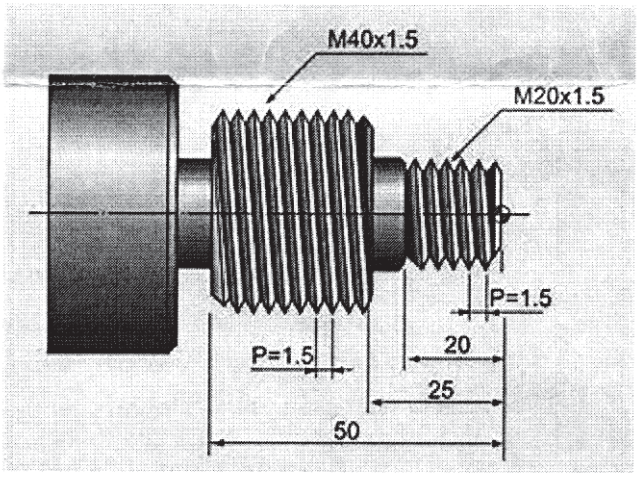


Figure 3:

Q7) a) Explain process of RP process. **[8]**

b) Write steps in Selective Laser Sintering method with its advantages. **[8]**

OR

Q8) a) Discuss file formats for required for RP machines. Discuss file format with neat sketch. **[8]**

b) Explain 3D printing with neat sketch. State merits and demerits of 3D printing. **[8]**

Q9) a) Classify Robots based on configuration. **[10]**

b) Explain Flexible Manufacturing Systems with merits and demerits. **[8]**

OR

Q10) Write Short note on any three: **[18]**

a) Hard Automation with merits and demerits.

b) Computer Integrated Manufacturing (CIM).

c) Computer Aided Process Planning.

d) End effectors.

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P34

[Total No. of Pages : 3

[5871]-534
B.E. (Mechanical)
DYNAMICS OF MACHINERY
(2015 Pattern) (Semester- I) (402043)

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) ***Draw neat diagrams wherever necessary.***
3) ***Use of scientific calculator is allowed.***
4) ***Assume suitable data if necessary.***
5) ***Figures to the right indicate full marks.***

Q1) a) Explain Dry friction damping. **[4]**

b) Explain the Principal Modes of vibration. **[6]**

OR

Q2) a) Explain frequency response curve with neat labeled diagram. **[5]**

b) A vibratory system in a vehicle is to be designed with the following parameter.

K = 100N/m, C = 2 N-sec/m, m=1 kg.

Calculate the decrease of amplitude from its starting value after 3 complete oscillation and frequency of oscillation. **[5]**

Q3) a) Explain with neat diagram mathematical model of a motorbike. **[4]**

b) Explain following term : **[6]**

i) Vibration isolation

ii) Quality factor

ii) Magnification factor

OR

Q4) a) Explain following terms : **[4]**

i) Zero frequency deflection

ii) Node point

P.T.O.

b) A vehicle moves over a road surface having approximately the sinusoidal profile with a wavelength of 10 m and amplitude of 80 mm. The vehicle is moving with a velocity of 55 km/hr. Calculate critical speed of vehicle, if the amplitude of vibration is 25 mm and mass of vehicle is 500 kg. **[6]**

OR

Q5) a) A five cylinder in-line engine running at 750 rpm. has successive cranks 144° apart, the distance between the cylinder center lines being 375mm. The piston stroke is 225 mm and the ratio of the connecting rod to the crank is 4. Examine the engine for balance of primary and secondary forces and couples. Find the maximum values of these and the position of the central crank at which these maximum values occur. The reciprocating mass for each cylinder is 15 kg. **[14]**

b) Explain direct & reverse crank method with neat diagram. **[4]**

OR

Q6) a) The axes of three cylinder air compressor are at 120° to one another and their connecting rods are coupled to single crank. The length of connecting rod is 240 mm and the stroke is 160 mm. The receprocating parts have a mass of 24kg per cylinder. Determine the primary and secondary forces if the engine runs at 2000 rpm. Use the concept of direct and reverse crank. **[12]**

b) Explain the partial balancing of single cylinder engine **[6]**

Q7) a) Explain various parameters used to measure vibratory response of a vibrating system. **[6]**

b) The static deflection of vibrometer mass is 20 mm. The instrument when attached to a machine vibrating with a frequency of 125 cpm records relative amplitude of 0.03 mm find **[6]**

1. Amplitude of vibration
2. Maximum velocity of vibration.
3. Maximum acceleration

c) Explain vibration isolators. **[4]**

OR

Q8) a) Explain MR damper as an effective control over vibration. **[6]**

b) It is required to measure the maximum acceleration of a machine, which vibrates violently with the frequency of 700 cycles per min. Accelerometer with negligible damping is attached to it and the indicator travels by 8.2mm. If the accelerometer weighs 0.5 kg and has a spring rate of 17500 N/m, what is the maximum amplitude and maximum acceleration of the part? **[4]**

c) Explain FFT analyzer with neat schematic diagram. **[6]**

OR

Q9) a) Noise at construction site is contributed by a few construction activities such as piling work: 104dB, bulldozer: 94 dB, scraper: 93 dB, Mobile compressor: 73 dB and mechanical shovel: 76 dB. What is overall sound pressure level?

Also determine sound pressure level when bulldozer is not is working condition. **[6]**

b) What is sound field? Explain various types of sound fields in the vicinity of sound source. **[6]**

c) Explain sound level meter with neat diagram. **[4]**

OR

Q10)a) Show that if distance from point source is doubles, the sound intensity level decreases by 6 dB. **[6]**

b) Explain in brief various sources of noise and how to control the same. **[6]**

c) Determine the sound pressure level of a source that generates a following rms sound pressure. **[4]**

a) $1.5 N/m^2$

b) 0.6 Pa

Total No. of Questions : 10]

SEAT No. :

P35

[Total No. of Pages : 3

[5871]-535

B.E. (Mechanical Engineering)

FINITE ELEMENT ANALYSIS

(2015 Pattern) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Use of electric pocket calculator is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the Principle of Rayleigh- Ritz Method. **[6]**

b) Explain the terms essential and natural boundary conditions with suitable example. **[4]**

OR

Q2) a) Derive the expression for element stiffness matrix for truss element. **[6]**

b) Explain "Galerkin Weighted Residual Method" to formulate FEM equations. **[4]**

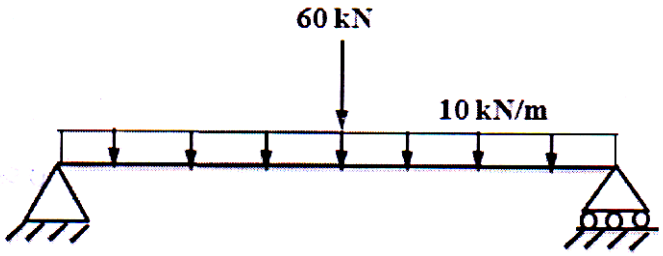
Q3) a) Explain the term geometric isotropy. Why polynomial shape functions should satisfy this requirement? **[6]**

b) Obtain expression for nodal load vector due to body force for 1D linear bar element and due to uniform distributed load for 1D beam element.**[4]**

OR

P.T.O.

Q4) A simply supported beam of length 8 m and uniform cross section is subjected to uniformly distributed load of intensity 10 kN/m over entire length of beam.A load of 60 kN is also applied at the mid-point of the beam as shown in figure. E = 200GPa and I = 2×10^{-4}. Using two element idealization, compute deflections and slopes. **[10]**



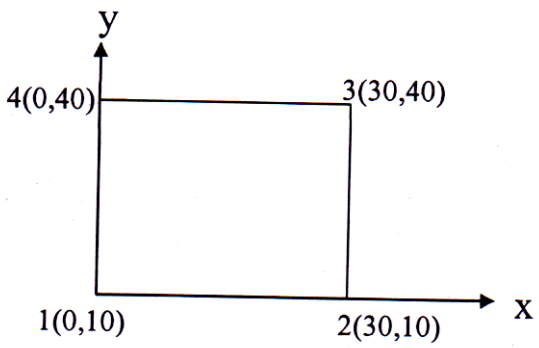
Q5) a) With neat sketch, write the expression for solving numerical integration by (3 × 3) and (2 × 3) Gauss Quadrature rule for quadrilateral finite elements. **[6]**

b) Obtain the shape function for nine node rectangular element. Use natural coordinate system varying from – 1 to +1. **[6]**

c) Explain the terms iso-parametric, sub-parametric and super-parametric elements. **[6]**

OR

Q6) a) For the quad element shown in figure, find out Jacobian matrix **[J]** and assemble strain-displacement matrix **[B]** for the Gaussian points (0.257, 0.655) **[10]**



b) Explain Gauss Quadrature rule for two dimensions. Check what order of Gauss Quadrature (i.e. No. of Gauss Points) Would exactly integrate the following. **[8]**

a) $2+3x+5x^3+8x^6$ b) $\left(x^2+y^2\right)$

c) $2+3x+5x^3$ d) $\left(2-x^2\right)/\left(2+x^2\right)$

Q7) a) Derive elemental stiffness matrix (conduction + convection) formulations for 1D steady state heat transfer problems. **[6]**

b) A flat plate of thickness 40 mm generates heat of 25 MW/m^3. The temperature on the left-side surface of the plate is 150 °C and that on the right-side surface is 100 °C. Assuming that thermal conductivity of the plate is 50 W/m °C, compute the temperature distribution across the thickness of plate. Area of heat conduction is 1 m^2. Use 3 elements for discretization. **[10]**

OR

Q8) A fin of length 12 cm has its cross section in form of rectangle of width 5 cm and thickness 2 cm. Its base (left end) is at 200 °C. The surrounding temperature is 25 °C, the convective heat transfer coefficient is 2000 W/m^2 °C, and conductivity of the fin material is 300 W/m°C. Determine the temperature distribution along the length of the fin by including convection over the right-end cross section along with the convection over the lateral surface of the fin. use 3 elements. **[16]**

Q9) Estimate natural frequencies and mode shapes of axial vibrations of stepped bar with area of cross-sections as A_1= 350 mm^2, L_1= 100 mm and A_2 = 250 mm^2, L_2= 100mm. Use consistent mass matrix. Modulus of elasticity E = 2 × 10^{11} N/m^2 and density ρ = 8000 kg/m^3. Model the bar by using two elements. **[16]**

OR

Q10)a) Derive consistent mass matrix for bar and truss element. **[10]**

b) Explain the significance of lumped mass matrix and consistent mass matrix. Write lumped mass matrix for bar and beam element. **[6]**

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

P36 **[Total No. of Pages : 2**

[5871]-536
B.E. (Mechanical)
COMPUTATIONAL FLUID DYNAMICS
(2015 Pattern) (Semester - I) (Elective - I) (402044B)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the mathematical nature of hyperbolic equation and their physical boundary conditions. **[4]**

b) Derive the Momentum equations for viscous flow. Consider suitable assumptions. **[6]**

OR

Q2) a) What is the significance of Convective and Local Derivative. **[4]**

b) Write short note on different physical boundary conditions used in numerical fluid flow simulations. **[6]**

Q3) a) Write CFD simulation procedure to solve a 2D steady state heat conduction problem by explicit method. **[4]**

b) What are the advantages of Finite volume method (FVM) over Finite difference Method (FDM) for particularly flow simulation (CFD)? **[6]**

OR

Q4) a) Comment on the accuracy of first order upwind scheme. **[4]**

b) Explain in detail the QUICK convective scheme. **[6]**

Q5) a) Discretize 2D heat convection-diffusion equation for slug flow with explicit finite volume method. **[10]**

b) Derive an expression of stability criteria for 1-D transient convection-diffusion system. **[8]**

OR

P.T.O.

Q6) a) Discretize steady 1-D convection diffusion equation using control volume approach. **[8]**

b) Show that for two dimensional convective-diffusive equation the CFL condition should be less than or equal to 0.5 for system to remain stable.**[10]**

$$\frac{\partial \phi}{\partial t} + u\frac{\partial \phi}{\partial x} + v\frac{\partial \phi}{\partial y} = v\left[\frac{\partial \phi^2}{\partial x^2} + \frac{\partial \phi^2}{\partial y^2}\right]$$

Q7) a) Discuss the challenges in solving Navier-Stokes Equations numerically? Suggest two remedies to overcome these challenges. **[6]**

b) Develop an algorithm to solve incompressible flow over an airfoil. **[10]**

OR

Q8) a) Using pressure correction method to solve a Lid driven cavity flow. **[8]**

b) Consider a suitable external flow case study and write in detail all the necessary steps to simulate using commercial software tool. **[8]**

Q9) a) Write a note on k - ω turbulence modeling. **[6]**

b) Classify turbulence modeling and comment on its advantages and disadvantages. Comment on the suitable turbulent model to simulate wake generation in flow over circular cylinder. **[10]**

OR

Q10)a) Write in details necessity of the turbulence modeling with suitable example. **[8]**

b) Write in detail CFD analysis process for numerical solution of flow through pipe. **[8]**

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

P37 **[Total No. of Pages : 3**

[5871]-537

B.E. (Mechanical Engineering)

HEATING VENTILATION & AIR CONDITIONING

(2015 Pattern) (Elective - I)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***All the three questions should be solved in one answer book and attach extra supplements if required.***
3) ***Draw Diagrams wherever necessary.***
4) ***Use of scientific calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain Multistage transcritical refrigeration cycle. **[6]**

b) Discuss advantages of CO_2 as a refrigerant **[4]**

OR

Q2) a) Discuss the thermodynamic analysis of steam ejector refrigeration cycle. **[8]**

b) List various types of mechanical draft cooling tower. **[2]**

Q3) a) A Dx-coil in a packaged conditioning system has supply volume flow rate of 2.6 m^3/s. Air enters the coil at a DBT of 25°C and a WBT of 19.4°C. Calculate the total cooling capacity of this DX coil at full load and the conditions of the air leaving the coil, using the following data: **[10]**

-Extended surface to inside tube surface area ratio =16.

-Boiling HTC for HCFC-22 inside the copper tubes of 4000 W/m^2K at 7.2°C.

-Surface effectiveness for wet fins = 0.76.

-Heat transfer coefficient of the outer surface of the coil (corrugated fin)73.25 $W.m^2K$.

-Total outer surface area = 56 m^2

- Specific Volume of air = 0.86 m^3/kg

OR

P.T.O.

Q4) a) Draw & explain electric circuit for oil pressure failure control. **[5]**

b) Discuss the various methods of capacity controls of centrifugal compressor. **[5]**

Q5) a) A building consists of a 2.5 m x 1.5 m window on the wall facing the wind and an opening of 1 .5 m x 2 m on the opposite window. The center to center distance between the windows in the vertical direction is 3.5 m. The outdoor temperature is 313 K, while the indoor is maintained at 300 K. Calculate the air flow rate due to the combined effect of wind and stack effect, if the wind blows at a speed of 15 kmph. Take C_w= 0.5, R= 1.3, C_s = 0.0707. **[8]**

b) Discuss airflow patterns of high side and ceiling diffusers inside conditioned space. **[8]**

OR

Q6) a) Discuss the various types of Indoor Air Contaminants. **[8]**

b) Explain the factors affecting thermal comforts. **[8]**

Q7) a) A 25 cm thick wall is exposed to the periodic temperature and incident radiant variation on an hourly basis between 7 am and 6 pm is given in the table. Determine the average and peak load (between 7 am to 6pm) on the air conditioner maintaining the room at 25°C per unit area of the wall. Also determine the heat gain at 1 pm and time of peak load. Use time lag and decrement method. **[12]**

Absorptivity of surface, a = 0.8

Thermal conductivity, k = 1.5 W/mK

Outside wall coefficient, h_o = 23 W/m^{2}K

Inside wall coefficient, h_i = 7 W/m^{2}K

Average sol-air temperature (T_{em}) = 44.14°C

Time lag = 6 hrs; Decrement factor = 0.455

Time	7 am	8 am	9 am	10 am	11 am	12 noon	1 pm	2 pm	3 pm	4 pm	5 pm	6 pm
$T_{\circ}$(°C)	29	31.5	33.5	35.5	37	38.5	39.5	40.5	41.5	39.5	39	38
I (W/m^2)	186	390	640	814	954	1000	960	825	645	385	190	47

b) Write a short note on "Space Load Characteristics" **[6]**

OR

Q8) a) Write a short note on “Energy Conservation Building Code” **[8]**

b) Explain the cooling load calculation procedure using CLTD method. **[10]**

Q9) a) Explain with schematic diagram Indirect Evaporative-Cooling Air Conditioning Systems. **[8]**

b) Draw and explain air-to-liquid heat pump circuit. **[8]**

OR

Q10)a) Explain any Thermal Storage Air Conditioning Systems and discuss advantages. **[8]**

b) Discuss Radiant Cooling Systems. **[8]**

Total No. of Questions : 10]

SEAT No. :

P38

[Total No. of Pages : 2

[5871]-538

B.E. (Mechanical)

AUTOMOBILE ENGINEERING

(2015 Pattern) (Semester - I) (Elective - II) (402045A)

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

Instructions to the candidates:

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

Q1) a) Draw a layout of automobile chassis and explain of it. **[5]**

b) Describe the current scenario and development in Indian auto industry. **[5]**

OR

Q2) a) Explain the purpose and requirement of front axle beam. **[5]**

b) Describe the necessity of gear box in automobile. **[5]**

Q3) a) Explain with neat sketch of rack and pinion type of steering gear box. **[5]**

b) Explain the terms **[5]**

i) Centre point of steering.

ii) Scrub radius.

OR

Q4) a) Explain with neat sketch of rubber type of suspension. **[5]**

b) Explain with neat sketch of vacuum assisted brake. **[5]**

Q5) a) What are different types of resistance on vehicles and explain them. **[6]**

b) Explain with neat sketch of stability of vehicle. **[6]**

c) What is vehicle testing on chassis dynamometry? What are the parameters can be measured on it? Explain any one parameter in details. **[6]**

OR

P.T.O.

Q6) Write short note on the following. **[18]**

a) Air bags

b) Seat belt

c) NVH in automobile

Q7) a) Explain with neat sketch of lithium battery. **[6]**

b) Explain the vehicle maintenance and servicing chart for clutch and gear. **[10]**

OR

Q8) a) Explain types of vehicle maintenance. **[8]**

b) Describe various tests on battery condition. **[8]**

Q9) a) What is a hybrid vehicle & describe the layout of electric vehicle and explain various components of it. **[9]**

b) Explain with neat sketch solar operated vehicles and gives its merits and demerits. **[9]**

OR

Q10)a) Explain layout of hybrid vehicle in detail. **[9]**

b) Compare EV's, HEV's & solar vehicle based upon merits & demerits?**[9]**

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

P39 **[Total No. of Pages : 5**

[5871]-539
B.E. (Mechanical)
OPERATION RESEARCH
(2015 Pattern) (Semester - I) (Elective - II) (402045B)

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

Instructions to the candidates:

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

Q1) a) Use big - M simplex method to minimize, $Z = 5X_1 + 6X_2$. **[10]**

Subject to $2X_1+5X_2 \geq 1500$;

$3X_1 + X_2 \geq 1200$ Where; $x,y \geq 0$

b) Reduce the following Game by Dominance and determine the value of game in table below. **[10]**

Person B

Person A	1	2	3	4
1	3	2	4	0
2	3	4	2	4
3	4	2	4	0
4	0	4	0	8

OR

Q2) a) Solve the following transportation problem. Use Vogel's Approximation Method to find initial basic feasible solution and stepping stone method to test optimality of solution. **[10]**

P.T.O.

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

b) Solve by simplx method : **[10]**

Maximize $z = 3x_1+2x_2$

$x_1+x_2 <= 4$; $x_1-x_2 <= 2$

$x_1, x_2 > 0$,

Q3) a) Table shows the manpower requirements for each activity in a project. **[12]**

i) Draw the network diagram of the project activities

ii) Rearrange the activities suitably for reducing the existing total manpower requirements.

iii) If only 9 men are available for the execution of the project, then rearrange the activities suitable for leveling the manpower resource.

Activity	Normal time	Manpower required
0-1	2	4
1-2	3	3
1-3	4	3
2-4	2	5
3-5	4	3
3-6	3	4
4-7	6	3
5-7	6	6
6-8	5	2
7-9	4	2
8-9	4	9

b) what is looping error and Dangling erros in the network? **[4]**

OR

Q4) a) The time estimates (in week) for the activities of a PERT network are given below : **[12]**

Activity	t_o	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

(i) Draw to project network and identify all the paths through it.

ii) Determine expected project length

iii) Calculate the standard deviation and variance of the project length

iv) What is the probability that project will be completed at least 4 weeks earlier than expected time?

v) If the project due date is 19 weeks, what is the probability of not meeting the due date?

vi) What should be the scheduled completion time for the probability of completion to be 90%.

b) Explain significance of PERT and CPM. **[4]**

Q5) a) There are seven jobs, each of which has to go through two machines A and B in the order AB. The processing times in hours are as follows:**[8]**

Job →	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

b) Solve the following sequencing problem giving an optimal solution when passing out is not allowed. **[8]**

Machines	Job				
	A	B	C	D	E
M1	11	13	9	16	17
M2	4	3	5	2	6
M3	6	7	5	8	4
M4	15	8	13	9	11

OR

Q6) a) Find an optimal sequence for the following sequencing problems of four jobs and five machines when passing out is not allowed of which processing time(in hours) is given below. Also find the total elapsed time. **[8]**

JOB	Machines				
	M1	M2	M3	M4	M5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

b) There are 5 jobs each of which is to be processed through machines A, B and C in the order A-B-C. The processing time in hours is given below:**[8]**

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

Q7) a) In a cargo loading problem, there are 4 items of different weight/unit and different value/unit as given in table. **[12]**

Item (*i*)	Weight/unit (*wi,kg/unit*)	Value/unit (*Pi, Rs/unit*)
1	1	1
2	3	5
3	4	7
4	6	11

The maximum cargo load is restricted to 17. How many units of each item be loaded to maximize the value?

b) Explain in brief dynamic programming model. **[6]**

OR

Q8) a) A firm has divided its marketing area into three zones. The amount of sales depends upon the number of salesmen in each zone. The firm has been collecting the data regarding sales and salesmen in each area over a number of past years. **[12]**

The information is summarized in following table. For the next year firm has only 9 salesmen and the problem is to allocate these salesmen to three different zones so that the total sales are maximum.

No. of Salesmen	Profit in thousands of rupees		
	Zone1	Zone2	Zone3
0	30	35	42
1	45	45	54
2	60	52	60
3	70	64	70
4	79	72	82
5	90	82	95
6	98	93	102
7	105	98	110
8	100	100	110
9	90	100	110

b) Explain methodology used in cutting plane method. **[6]**

❍❍❍❍

Total No. of Questions : 10]

SEAT No. :

P40

[Total No. of Pages : 3

[5871]-540
B.E. (Mechanical)
ENERGY AUDIT & MANAGEMENT
(2015 Pattern) (Semester - I) (Elective - II) (402045C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer full questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Answers should be written in same answer book.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of log tables, slide rules, mollier charts, electronic calculator and steam table is allowed.***
5) ***Assume sutable data if necessary.***

Q1) a) Discuss the Aspects of energy policy and strategy in energy conservation system. **[6]**

b) Write a short note on energy conservation act 2001. **[4]**

OR

Q2) a) Explain the principles of energy management. **[6]**

b) Explain the role and responsibility of energy auditor. **[4]**

Q3) In the washing process of an automobile plant, electricity is being used to heat 5000 litres/hr of water by 8 °C. The industry is planning to convert from Electrical heating to LPG heating. **[10]**

Other Parameters: Annual operating hours = 6000 hours. Efficiency of indirect heating with LPG = 85%. Efficiency of electrical heating = 95%, Calorific value of LPG = 12.000 kcal/kg. Landed cost of LPG = Rs.60/kg, Cost of electricity = Rs.8/kW.

If electrical heating is replaced with LPG heating. with an investment is Rs.15 lakhs. compute the simple payback period.

OR

P.T.O.

Q4) In an industry, an electrical oven consuming 1100 kWh/batch. is proposed for replacement. by a FO fuel fired oven. Calculate the simple payback period, given the following data : **[10]**

Number of batches / years = 4000

Efficiency of electric oven = 82%

Efficiency of FO fired oven = 55%

Cost of FO = Rs.35,000/Tonne

GCV of FO = 10,200 kcal/kg

Electricity cost Rs.6.0/kWh

Investment for FO fired oven = Rs. 125 Lakhs

Q5) a) Explain the steam distribution system with neat sketch. **[8]**

b) An economizer was installed in an oil-fired boiler. The following data was obtained after commissioning the economizer. **[10]**

- Air to fuel ratio 18
- Evaporation ratio of the boiler 12.5
- Specific heat of flue gas 0.25 kcal/kg°C.
- Condensate recovery in the plant = Nil.

Calculate the rise in temperature of feed water across the economizer. corresponding to a drop in flue gas temperature from 280 °C to 190 °C.

OR

Q6) a) Illustrate the energy conservation opportunities in Boiler. **[8]**

b) In a double pipe heat exchanger. flow rates of the hot and the cold-water streams flowing through a heat exchanger are 10 and 25 kg/min, respectively. Hot and cold-water stream inlet temperatures are 70 °C and 27 °C. respectively. The exit temperature of the hot stream is required to be 50°C. The specific heat of water is 4.179 KJ/kg K. The overall heat transfer coefficient is 900 W/m^2 K. Neglecting the effect of fouling, calculate the heat transfer area for **[10]**

i) Parallel-flow ii) Counter-flow.

Q7) a) Explain various energy saving opportunities in Illumination. **[8]**

b) Write note on Power factor improvement in electrical systems. **[8]**

OR

Q8) a) Write note on electrical motors with their types and applications. **[8]**

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

Q9) a) What are the important technical parameters for selection of cogeneration system? **[8]**

b) With a suitable diagram explain the principle of working of Heat Wheel. **[8]**

OR

Q10) a) Write a note on CDM projects and Carbon credit calculations. **[8]**

b) Write a note on PRV and Microturbine. **[8]**

Total No. of Questions : 10]

SEAT No. :

P41

[Total No. of Pages : 3

[5871]-541

B.E. (Mechanical & Mechanical S/W)

ENERGY ENGINEERING

(2015 Pattern) (Semester - II) (402047)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, 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 wherever necessary and mention the same clearly.***
5) ***Use of steam tables, Mollier chart and calculator is allowed.***

Q1) a) Explain any five factors that are considered for the site selection of thermal power plant. **[5]**

b) Write a short note on present status of power generation in India and Maharashtra. **[5]**

OR

Q2) a) What are different types of ash handling systems? Explain mechanical ash handling with neat sketch. **[5]**

b) With a neat sketch explain Rankine cycle with regeneration. **[5]**

Q3) a) Explain hydrograph and flow duration curve with neat sketch for hydroelectric power plant. **[5]**

b) Explain closed type condensing plant in brief with simple diagram. **[5]**

OR

Q4) a) What is thermal pollution from thermal power plant?Explain methods of reducing it. **[5]**

b) Write a note on elements of nuclear power plant. Draw a neat sketch.**[5]**

P.T.O.

Q5) a) Describe with neat sketches typical layout high load diesel power plant. What are advantages of diesel power plant? **[8]**

b) A gas turbine has a pressure ratio of 6 and the maximum cycle temperature is 900°C. The isentropic efficiencies of the compressor and turbine are 85% and 90% respectively. Air enters the compressor at 15°C at the rate of 5 kg/sec. CV of fuel used in 43,000 kJ/kg, combustion efficiency is 95%. Using C_{pa} = 1 kJ/kg K, C_{pg} = 1.07 kJ/kg K, and γ = l.4 for air and gases, find **[8]**

i) Air fuel ratio

ii) Thermal efficiency

OR

Q6) a) Explain any one arrangement of gas and steam turbine combined cycle power plant with neat sketch.State its advantages. **[8]**

b) A 8 cylinder four stroke diesel engine of 9 cm bore and 8 cm stroke length with compression ratio of 7 is tested at 4500 rpm. The radius of the break drum of dynamometer is 50 cm. During 10 minutes test, the dynamometer reading was 42 kg and consumed 4.4 kg of petrol having CV of 44 MJ/kg. Air of 27°C and 1 bar was supplied to carburetor at the rate of 6 kg/min. Calculate brake power, brake specific fuel consumption, brake mean effective pressure and brake thermal efficiency. **[8]**

Q7) a) Explain with neat sketch construction and working of high temperature solar thermal power plant. **[6]**

b) Explain with neat sketch the working of open cycle MHD generator. **[6]**

c) Explain any one tidal power plant with neat sketch. **[6]**

OR

Q8) a) Explain with neat sketch principle and working of binary cycle geothermal plant. **[6]**

b) Write note on operating characteristics of wind mill. **[6]**

c) Explain closed cycle OTEC with typical layout. **[6]**

Q9) a) Explain significance of **[8]**

i) Load factor

ii) Diversity factor

iii) Plant capacity factor

iv) Demand factor

b) Following data relate to a 10000 kW thermal power station. **[8]**

Cost of plant = Rs. 12000 /kW

Interest and depreciation = 10% per annum

Cost of coal = Rs. 400 /tonne

Operating cost = Rs. 4×10^5 per annum

Annual salary = Rs. 1.3×10^5

Plant maintenance cost (variable) = Rs. 40000 per annum

Plant maintenance cost (fixed) = Rs. 20000 per annum

Maximum demand = 9000 kW

Load factor = 60%

Consumption of coal = 25300 tonne per annum

Find :

i) Annual fixed charges per kW

ii) Annual running chargesper kWh

OR

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

i) Power Transformer

ii) Exciters

b) The incremental fuel cost for two generation unit 1 and 2 of a power plant are given by the equation, $dF_1 / dP_1 = 0.07 P_1 + 24$; $dF_2 / dP_2 = 0.075 P_2 + 22$

Where, F is the fuel cost in rupees per hour and P is the power output in MW. **[8]**

Determine :

i) The economic loading of two units when the total load supplied by the power plant is 180 kW.

ii) The loss in fuel cost per hour if the load is equally shared by both units.

Total No. of Questions : 10]

SEAT No. :

P42

[Total No. of Pages : 4

[5871]-542

B. E. (Mechanical / Mechanical Sandwich)

MECHANICAL SYSTEM DESIGN

(2015 Pattern) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Draw speed ray diagram for the following structural formulae i) 2(3)3(1) ii) 2(1)3(2) The minimum output speed is 160 r.p.m. and the maximum output speed is 1000 r.p.m. The motor shaft speed is 1440 r.p.m. **[6]**

b) Explain methods of representing frequency distribution. **[4]**

OR

Q2) a) Draw the systematic structure diagrams and identify the optimum structure diagram for the following structural formulae: i) z = 2(1)2(2)3(4) ii) z = 2(1)2(6)3(2) iii) z = 2(2) 2(1) 3(4) **[6]**

b) Define design tolerance (DT) and natural tolerance (NT) in statistical design. State what happens when NT=DT, NT>DT and DT>NT. **[4]**

Q3) a) Differentiate between Angle of Repose and Surcharge Angle? **[4]**

b) A three idler, troughed belt, horizontal conveyor is to be used for transporting 500 ton of iron per hour having mass density of iron ore is 1700 kg/m3. If the belt speed is 2m/sec, determine the required belt width. Take surcharge factor = 0.1. **[6]**

OR

P.T.O.

Q4) a) State the appropriate guidelines for selection of material handling system **[4]**

b) A flat horizontal belt conveyor is to be used for transporting material with mass density of 3 ton/m^3. The belt is 750mm wide and has speed of 2.75 m/s Determine capacity of conveyor if surcharge angle is 25° ($k = 2.35*10^{-4}$). **[6]**

Q5) a) Derive Clavarino's equation for thick cylinder subjected to an internal pressure. **[8]**

b) A cylindrical pressure vessel shell of inside diameter 1500mm is subjected to an internal pressure of 2 MPa. The shell as well as heads is made of low alloy steel with an ultimate tensile strength of 450/N mm^2. The double welded butt joints which are spot radio graphed is used to fabricate the vessel. The corrosion allowance is 3 mm. Determine the thickness of the cylindrical shell and the thickness of the head if the head are:

i) Flat

ii) Plain formed

iii) Torispherical with crown radius of 1125 mm

iv) Semi-elliptical, with ratio of major axis to minor axis as 2

v) Conical, with semi-cone angle of 30^0. Efficiency = 0.85. **[10]**

OR

Q6) The following data refers to single acting hydraulic cylinder. **[18]**

Pressure of hydraulic fluid	= 10 MPa
Operating force available at the piston rod	= 15 KN
Friction due to piston ring and stuffing box	= 10% of operating force
Thickness of cylinder flange	= 10mm
Thickness of cylinder head	= 8 mm
Cylinder and, cylinder head material	= FG200
Modulus of elasticity for FG200	= 100 GPa
Thickness of Zinc gasket	= 3 mm
Modulus of elasticity for zinc	= 83 GPa
Number of bolts	= 4
Preload in each bolt	= 2.8 KN

Bolt material	= FeE400
Modulus of elasticity for FeE 400	= 207 GPa
Factor of safety for cylinder	= 5
Factor of safety for bolts	= 6
Standard diameter of cylinder	= 20, 30, 40, 50,60 mm
Standard Thickness of cylinder	= 2, 4, 5, 6, 7, 8, 10mm
Standard diameter of bolts	= 8,10,12,14,16,18,20,22 mm

Determine: i) Inner diameter of cylinder ii) Thickness of cylinder
iii) Diameter of bolts

Q7) a) What is the difference between centre and overhung crankshafts? **[6]**

b) The following data is given for the cap and bolts of the big end of the connecting rod:

Engine speed	= 1500rpm
Length of connecting rod	= 0.320m
Length of stroke	= 0.140m
Mass of reciprocating parts	= 1.75kg
Length of crank pin	= 54mm
Diameter of crank pin	= 38mm

Permissible tensile stress for balts and bending stress for cap 120N/mm^2.

Calculate the nominal diameter of bolts and thickness of cap for the big end. **[10]**

OR

Q8) The following data is given for a four- stroke diesel engine : **[16]**

Cylinder bore	= 250 mm
Length of stroke	= 300mm
Speed	= 600 rpm
Indicated mean effective pressure	= 0.6 MPa.
Mechanical efficiency	= 80 %

Maximum gas pressure = 4 MPa

Fuel consumption = 0.25 kg per BP per hr.

Higher calorific value of fuel = 44000 KJ/kg

Assume that 5% of total heat developed in the cylinder is transmitted by the piston. The piston is made of gray C.I FG 200 (Sut = 200 N/mm^2 and K = 46.6 W/m/°C) and the factor of safety is 5. The temperature difference between the center and the edge of the piston head is 220°C.

i) Determine the thickness of piston head by strength consideration and thermal consideration.

ii) State whether the ribs are required, If so calculate the number and thickness of ribs.

iii) State whether a cup is required in the top of piston head, If so calculate the radius of the cup

Q9) a) What is adequate design and optimum design? Explain with suitable examples. **[6]**

b) A helical compression spring is to be designed for a specified maximum force F. The spring should have stiffness 'K' and factor of safety based on yield strength in shear is 4. Design the spring for minimum weight. Neglect effect of inactive coils.Assume wahl's factor- K_W **[10]**

OR

Q10) A line shaft required to transmit power of 40KW at 425 rpm and the torsional stiffness of the shaft is 120N.m/Degree. Required factor of safety is 1.2. Design the shaft using maximum shear stress theory for minimum weight. Use above given material properties. What will be the change in design for minimum cost? **[16]**

Material	Density kg/m^3	Tensile Strength MPa	Modulus of Rigidity MPa	Material cost, C (Rs/N)
M1	7800	550	82000	20
M2	2800	180	27000	38
M3	1800	120	17000	550

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Total No. of Questions : 10]

SEAT No. : ____

P43

[Total No. of Pages : 3

[5871]-543

B.E. (Mechanical)

TRIBOLOGY

(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain the importance of tribology in design of different machine elements? **[6]**

b) Enlist desirable properties of lubricants? **[4]**

OR

Q2) a) Enlist the different methods to measure friction and explain pin-on-disc rig. **[6]**

b) What is the key difference between gasket and oil seal? Explain non-metallic gasket. **[4]**

Q3) a) Derive Archard's equation for volume of adhesive wear. **[4]**

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

i) Fretting wear

ii) Solid wear

iii) Liquid erosion

OR

Q4) Babbit lined steel back bush bearing is used to support a shaft of diameter 50mm and length of 50 mm. the radial load on the bearing is 3550N. The oil filter restricts a clearance at the bearing as 40 microns. The shaft rotates at 950 rpm. If the oil used has a viscosity of 60 cp at operating temperature.**[10]** Calculate :

a) Coefficient of friction

b) Minimum oil film thickness

c) Power loss due to friction

d) Required oil flow in lit per min

e) Side leakage in lit per min

P.T.O.

$\frac{L}{d}$	$\frac{h_0}{c}$	S	$\left(\frac{r}{c}\right) f$	$\frac{Q}{r c n_s L}$	$\frac{Q_s}{Q}$
1	0.8	0.631	12.8	3.59	0.280
	0.6	0.261	5.79	3.99	0.497
	0.4	0.121	3.22	4.33	0.680
	0.2	0.0446	1.70	4.62	0.842
	0.1	0.0188	1.05	4.74	0.919

Q5) a) Explain working principle of hydrostatic bearing with figure. Compare hydrostatic bearing with hydrodynamic bearing. **[10]**

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

OR

Q6) a) What is squeeze film lubrication? State the merits, demerits and applications of squeeze film lubrication. **[8]**

b) The following data is given for hydrostatic thrust bearing **[10]**

Supply pressure = 5MPa,

Shaft speed = 720 rpm

Shaft diameter = 400mm.

Recess diameter = 250mm

Film thickness = 0.15mm

Viscosity of lubricant =30cP

Specific heat of lubricant = 1 .76 kJ/kg°C

Specific gravity of lubricant =0.86

Calculate :

i) Load carrying capacity of bearing

ii) Frictional power loss

iii) Pumping power loss

Temperature rise by assuming the total power loss in bearing is converted into the frictional heat.

Q7) a) Explain the phenomenon of Elasto-hydrodynamic lubrication and state the application where EHD lubrication is observed. **[8]**

b) Explain Merits, demerits and application of gas bearing. **[8]**

OR

Q8) a) Explain in brief about the active and passive magnetic bearing. What are its advantages over conventional bearing? **[8]**

b) What do you understand by gas lubricated bearing? Compare gas lubricated with oil lubricated bearing based on the following points. **[8]**

i) Viscosity of lubricant

ii) Viscous resistance

iii) Frictional power loss

iv) Operating speed

v) Load carrying capacity

vi) Film thickness and Surface Thickness

Q9) a) Write short notes on : **[8]**

i) Lubricating system in wire rope

ii) Lubricating system in seals and packaging

b) Write short note on: selection of coatings **[8]**

OR

Q10) a) State and discuss the lubricant and lubricating methods for gears. **[8]**

b) How surface engineering processes are specified? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P44

[Total No. of Pages : 3

[5871]-544

B.E. (Mechanical/Atuomobile)

INDUSTRIAL ENGINEERING

(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of programmable calculator is not permitted.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain principle of management & List out objective and application of industrial engineering. **[6]**

b) Differentiate between value engineering and value analysis. **[4]**

OR

Q2) a) Explain work study and method study in detail. **[6]**

b) Write short note on : **[4]**

i) MOST

ii) PMTS

Q3) a) Explain MRP-I & MRP-II & also differentiate it with three points. **[6]**

b) The historical data on the sale of Washing Machine for the last 12 years is given below. By the method of three yearly moving average establish the trend values and forecast demand for 13th year. If actual demand for 13th year is 520 nos. What shall be the forecast for l4th year? **[9]**

Year	1	2	3	4	5	6	7	8	9	10	11	12
Sales No.	332	344	328	336	370	408	420	432	428	450	498	240

OR

Q4) a) Explain the following terms in brief : **[6]**

i) Batch Production

ii) Make To Stock (MTS)

iii) ERP

P.T.O.

b) The historical data on the sale of coolers of a company for the year 2011 to 2017 is given below. Using the regression analysis establish the trend values and extrapolate for the year 2018 ignoring the effect of seasonal and random fluctuations. What is the forecast for the year 2018. **[9]**

Year	2011	2012	2013	2014	2015	2016	2017
Sales	3286	4751	5867	4580	5020	8444	11072

Q5) a) Explain the following terms in brief **[6]**

i) Plant Layout

ii) Craft, Blocplan, Corelap

iii) Industrial containers

b) A company spend Rs. 34000/- on its purchasing activity and Rs. 67200/- for maintenance of inventory of Rs.420000/- annually. Around 850 orders are placed every year to replenish stocks of the various items.One of the item whose annual consumption is 9600 nos. costing Rs.30/- each is brought by the company based on staggered deliveries.How frequently should the company receive staggered deliveries and in what quantities? What is the corresponding annual total cost for this item? **[9]**

OR

Q6) a) What are the different factors affecting the plant location planning & principles of Material Handling. **[6]**

b) A company buys an item in lost of 500 units which is a three months requirement.The cost per unit is Rs. 90 and the ordering cost is Rs. 180 per batch order.The inventory carrying cost is estimated at 20% of the average inventory investment. What is the annual total cost of existing inventory policy ?How much money can be saved from economic order quantity purchase? **[9]**

Q7) a) What do you understand by Industrial safety? **[5]**

b) An industry manufacturing small capacity motors has the cost structure as follows : **[9]**

i) Material Cost: Rs. 50

ii) Labour Cost: Rs. 80

iii) Variable Overhead: 75 % of labour cost

iv) Fixed Overhead: Rs. 2,40,000/annum

v) Sales Price: Rs.230 / motor

vi) Determine the number of motors to be manufactured to break-even?

Number of motors to be sold to make a profit of Rs.1,00,000 /-

Number of motors to be sold to break even if price is reduced by Rs. 15/- motors.

c) Explain Payback & KRA **[6]**

OR

Q8) a) Explain Debit and Credit notes? **[5]**

b) The fixed cost for the year 1979-80 is Rs. 5,00,000 variable cost per unit is Rs. 25. The estimated sales for the period are valued Rs. 15,00, 000.Each unit sales at Rs.150. Determine : **[9]**

i) Break Even Point

ii) Rs. 12,00,000 will be the likely turnover for the next budget period, calculate the estimated contribution and profit.

iii) If a profit target of Rs. 6,50,000 has been budgeted, compute the turnover required.

c) Explain the following term in brief : **[6]**

i) Supply Chain management

ii) Inventory

iii) Manpower Planning

Total No. of Questions : 10]

SEAT No. : ____

P45

[Total No. of Pages : 2

[5871]-545
B.E. (Mechanical)
ROBOTICS
(2015 Pattern) (Semester - II) (Elective - III)

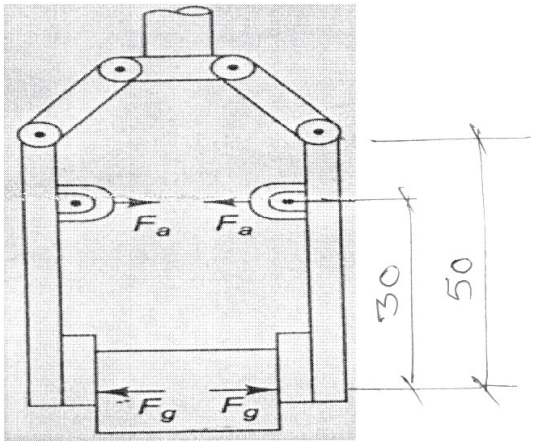
Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

Q1) a) Discuss anatomy of robot with neat sketch. **[6]**

b) A simple pivot type of gripper is used to hold boxes as shown in fig.1. The gripping force required is 40 kgf. The gripper is to be actuated by piston device to apply actuating force Fa. Calculate actuating force Fa. **[4]**



OR

Q2) A 25 kg rectangular block is gripped in the middle & lifted vertically at velocity of 1.5 m/s. If it accelerates to this velocity at 27.5m/s^2 and the coefficient of friction between the gripping pads & block is 0.50, calculate minimum force that would prevent slippage. **[10]**

Q3) a) Write short note on 'SCARA' robot. **[5]**

b) Differentiate between hydraulic and pneumatic actuators. **[5]**

OR

P.T.O.

Q4) a) Write characteristic equation of P-I-D controller and its characteristic equation. **[5]**

b) Explain tactile sensor with neat sketch. **[5]**

Q5) a) Explain approach for robot dynamic modeling. **[8]**

b) An actuated joint of 6 DoF robot is rotated from 10 degree to 75 degree in 8 seconds, determine coefficients of cubic polynomial for smooth trajectory planning. **[8]**

OR

Q6) a) Describe steps involved in trajectory planning. **[8]**

b) Write short note on 'Newton-Euler Formulation' **[8]**

Q7) a) Explain role of image processing in Robotics. **[6]**

b) Write program for palletizing operation of cylindrical object of 50 mm diameter and 100 mm length on rectangular pallet of 500mm X 500 mm. Estimate maximum number of cylinders on a pallet keeping 50mm distance from sides and 60 mm center to center distance between cylindrical objects. **[10]**

OR

Q8) a) Describe 'Lead through programming' in brief. **[8]**

b) What is robot programming? Write code for 'Wait', 'Stop' and 'Delay' commands. **[8]**

Q9) a) Explain various components of AI. **[8]**

b) Enlist various simulation models and discuss them in brief. **[10]**

OR

Ql0) Write short note on : **[18]**

a) Industry 4.0

b) PUMA robot

c) RCC in Robotics

Total No. of Questions : 10]

SEAT No. :

P46

[Total No. of Pages : 2

[5871]-546

B.E. (Mechanical Engineering)

ADVANCED MANUFACTURING PROCESSES

(2015 Pattern) (Semester - II) (Elective - IV) (402050A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All question are compulsory. Q.No.1 or Q.No.2, Q.No.3or 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 diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain with neat sketch Electro Hydraulic Forming and list their applications. **[6]**

b) Explain with sketch working principle of Thermal Spray Coating process. **[4]**

OR

Q2) a) Explain with neat sketch Hydro Forming process and list their applications. **[6]**

b) Explain with sketch working principle of Electron Beam Welding. **[4]**

Q3) a) Explain with schematic the working principle and material removal mechanism of Electrolytic In Process Dressing. **[6]**

b) State the advantages and disadvantages of Explosive Welding. **[4]**

OR

Q4) a) Explain with neat sketch working principle of Abrasive Water Jet Machining **[6]**

b) Explain the working principle of Adhesive Bonding. **[4]**

Q5) a) With a schematic describe the five components of Diamond Turn Machine based on their functionality. **[8]**

b) Write a short note on Focused Ion Beam Mechanism. Also explain the challenges in Micro and Nano fabrication Techniques. **[8]**

OR

P.T.O.

Q6) a) With a schematic explain the set up and the working principle of Ultrasonic Micromachining process. **[8]**

b) With a schematic explain the steps involve in Photochemical Machining. **[8]**

Q7) a) With neat sketch explain the Sheet Lamination Process. **[6]**

b) Explain in detail post processing of parts manufactured by Additive Manufacturing Process. **[6]**

c) Write short note on software issues in Additive Manufacturing. **[4]**

OR

Q8) a) With neat sketch explain the Powder Based Additive Manufacturing Process. **[6]**

b) What are the advantages of Additive Manufacturing Process over Subtractive Manufacturing Process. **[6]**

c) Write short note on Design for Additive Manufacturing. **[4]**

OR

Q9) a) Explain with schematic working principle of Atomic Force Microscope. **[6]**

b) State the advantages of .Electron Microscope over Optical Microscope. **[6]**

c) Describe the applications of Spectroscope. **[6]**

OR

Q10)a) Explain with schematic working principle of X-ray Diffraction. **[6]**

b) Describe the applications of Microscope. **[6]**

c) Compare scanning Tunnelling Microscope with Transmission Electron Microscope. **[6]**

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

P47 **[Total No. of Pages : 1**

[5871]-547

B.E. (Mechanical Engineering)

SOLAR AND WIND ENERGY

(2015 Pattern) (Semester - II) (402050 B) (Elective -IV)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right side indicates full marks.***

Q1) a) Explain different solar energy applications in thermal & PV system. (atleast one from each) **[8]**

b) Draw the solar geometry and define solar beam, defuse and total radiation. **[7]**

OR

Q2) a) Solar energy globe scenario and role of the government bodies for solar and wind energy. **[8]**

b) Explain solar pond with neat sketch. Give its advantages and limitations. **[7]**

Q3) a) Classify solar thermal collectors and describe flat plate collector with the help of suitable diagram. **[8]**

b) Explain solar PV cell with sketch give different types of PV panels available in market. **[7]**

OR

Q4) a) Give different solar thermal applications which are classified in the group of concentrating and nonconcentrating types of collector. **[8]**
Explain any one concentrated type of collector in short.

b) Differentiate between solar ongride & off gride. PV system. **[7]**

Q5) Draw the solar ETC system used for agricultural food product. Design the system to dry grapes of 10kg from 78% initial moisture content to 18% final moisture content take thermal efficiency of collector as 35% and drying efficiency as 68%. Daily avg. Solar radiation 720 wp/m^2. Drying time 36 hrs. find the moisture removal rate. **[20]**

Q6) Explain in detail step by step design process of horizontal wind mill. Also explain the potential and status of wind energy scenario in India. **[20]**

✠ ✠ ✠

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

P48 **[Total No. of Pages : 2**

[5871]-548

B.E. (Mechanical)

PRODUCT DESIGN AND DEVELOPMENT (402050 - C)

(2015 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates:

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

Q1) a) Write a note on standardization, simplification and specialization in product development. **[6]**

b) Define the concept of Product Design and discuss it's significance from modern perspective. **[4]**

OR

Q2) a) What is the importance of Technical Questioning from design perspective? Discuss with a suitable example. **[5]**

b) How is S curve applicable in Product Design? Discribe with its sketch any two phases in the Curve. **[5]**

Q3) a) Discuss the concept of Concurrent Design and explain with a suitable example its importance for a Product Designer. **[7]**

b) Describe product verification in brief. **[3]**

OR

Q4) a) What is Morphology of Product Design? Discuss any three stages in Morphology of Product Design. **[5]**

b) Write a note on Kano model. How to convert customer's voice into Critical to Quality issues? **[5]**

Q5) a) What is product tear down? Discuss its process in accordance with Reengineering. **[10]**

b) Explain the process of Force Flow Diagrams. Also explain its significance from a designer's perspective. **[8]**

OR

P.T.O.

Q6) a) Discuss and compare design for assembly and design for piece part production. Elaborate with an example. **[10]**

b) Discuss in detail the need for design for environment. How is it different from conventional design process? **[8]**

Q7) a) What is meant by reliability? Explain designing for reliability for Design Engineers. **[8]**

b) Explain global, local and regional issues related with product development process. **[8]**

OR

Q8) a) Designers perspective for manufacturability is crucial for future market related issues. Write some examples to justify your statements. **[8]**

b) Compare between FMEA and DFMEA in terms of their specific application, significance and process. **[8]**

Q9) a) What is PLM? What are the phases involved in it? Explain any two in detail with suitable example. **[8]**

b) What is the importance of PLM and PDM for a Designer? How does these technologies have brought revolution with the design sector? **[8]**

OR

Q10)a) Explain background, overview and need of Product Life Cycle from a product developer's angle. **[8]**

b) Write a note on Product Data and Product Work Flow. **[8]**

✠ ✠ ✠

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

[5871]-549

B.E. (Mechanical)

REFRIGERATION AND AIR-CONDITIONING

(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer three questions out of 6.***
2) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
3) ***All the three questions should be solved in one answer book and attach extra supplements if required.***
4) ***Draw diagrams wherever necessary.***
5) ***Use of scientific calculator is allowed.***
6) ***Assume suitable data wherever necessary.***

Q1) a) An air refrigeration system working on Bell-Coleman cycle is used to make ice at –5°C from water at 15°C. The suction and compression pressures are 1 bar and 5 bar. **[5]**

Find :

i) COP

ii) Ice produced per kWh. Cp of ice = 2.1 kJ/kgK.

b) Explain the concept of recovery reclaims and recycle. **[5]**

OR

Q2) An ammonia refrigeration machine operated between the temperature limits 15°C and 30°C. The machine circulates 4.5kg/min. There is no undercooling. The temperature after isentropic compression is 75°C. **[10]**

Determine :

i) COP

ii) Ice produced in kg/hr from water at 20°C and ice at –5°C.

iii) Quality of refrigerant entering the compressor.

Assume C_{pv} = 2.85 kJ/kg/K for ammonia. C_p of ice = 2.1 kJ/kgK. Also find displacement volume required for compressor in m^3/min.

Ts(°C)	h_f (kJ/kg)	h_g (kJ/kg)	S_f (kJ/kgk)	S_g (kJ/kgk)	V_f (m^3/kg)	V_g (m^3/kg)
–15	112.3	1426	457	5.549	0.00152	0.509
30	323.1	1469	1.204	4.984	0.00158	0.111

P.T.O.

Q3) a) Explain Electrolux refrigeration system with neat sketch. **[5]**

b) Explain uses of flash chamber. **[5]**

OR

Q4) Explain the analysis of individual compressor, multiple expansion valve and two evaporator multipressure system. **[10]**

Q5) a) Describe the process of adiabatic mixing of two streams of air : **[6]**

b) Explain the term : **[10]**

i) Relative humidity

ii) Specific humidity

iii) Absolute humidity

iv) Degree of saturation

v) Dew-point temperature

OR

Q6) a) On a particular day, the atmospheric air was found to have a dry bulb temperature of 30°C & wet bulb temperature of 18°C. The barometric pressure was observed to be 756 mm of Hg. Without using Psychrometric chart, determine the following properties of moist air : **[12]**

i) RH

ii) The specific humidity,

iii) The dew point temperature

iv) The enthalpy of air per kg of dry air

b) Explain "Thermodynamics of human body". **[4]**

Q7) a) Explain all air air-conditioning system with neat sketch. **[8]**

b) Explain the construction working of DX-type evaporator. **[8]**

OR

Q8) a) Discuss classification of air-conditioning. **[4]**

b) Discuss various types of Condensers with application **[6]**

c) Explain construction working of screw compressors. **[6]**

Q9) a) A circular duct of 250 mm is selected to carry air in an air conditioned space at a velocity of 240m/min to keep the noise at desired level. If this duct is to be replaced by rectangular duct of aspect ratio of 1.4, find the size of the duct for equal friction method when. **[12]**

i) Velocity of air in two ducts is same and

ii) Discharge of air in two ducts is same lf f = 0.015, find pressure loss per 100 m length of duct. Take air density as 1.15 kg/m^3.

b) What are the desirable properties of ideal duct materials? **[6]**

OR

Q10) a) Write a note on classification of duct and explain air flow through simple duct system. **[10]**

b) Explain Equal Friction Method of Duct Design. List its advantages and disadvantages. **[8]**

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

P50 **[Total No. of Pages : 2**

[5871]-550
B.E. (Mechanical Sandwich)
AUTOMOBILE ENGINEERING
(2015 Pattern) (Semester - I) (Self Study - III) (402064)

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

Instructions to the candidates:

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

Q1) a) Explain front engine front wheel drive with neat sketch? **[5]**

b) Explain defects in frames & define frame? **[5]**

OR

Q2) a) What are the functions of axels? Differentiate between live axel and dead axel? **[5]**

b) What are the different types of clutches? Explain single plate clutch? **[5]**

Q3) a) Explain overdrive with neat sketch? **[5]**

b) Explain stearing geometry with neat sketch? **[5]**

OR

Q4) a) Explain different types of springs used in suspension system? **[5]**

b) Explain factors affecting brake performance? **[5]**

Q5) a) Explain active safety & passive safety? **[8]**

b) What are the components of engine management system? Explain in detail. **[8]**

OR

Q6) a) What is the role of ergonomics in automobile safety? Explain in detail? **[8]**

b) Explain windscreen wipper working with neat sketch? **[8]**

Q7) a) Explain free acceleration test & wheel test? **[8]**

b) Explain crash testing & it's types? **[8]**

OR

P.T.O.

Q8) a) What is traction & traction effort? **[8]**

b) Explain different types of test tracks. **[8]**

Q9) a) Explain with neat sketch multiaxel vehicle? **[9]**

b) Write various applications of offroad machines? **[9]**

OR

Q10)a) Explain single bucket, Multibucket & Rotary type dumpers? **[9]**

b) Write a note on specifications, general description & functions of light, medium & heavy wheeled tractors? **[9]**

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

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[5871]-551
B.E. (Mechanical Sandwich)
PLANT ENGINEERING AND MAINTENANCE
(Self Study-III)
(2015 Pattern) (Semester - I) (402065)

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

Instructions to the candidates:

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

Q1) a) Discuss Preventive Maintenance in Detail. **[6]**

b) Explain Muther's plant layout procedure with neat diagram. **[4]**

OR

Q2) a) What are the different basic plant facilities? Explain Work routine Maintenance System. **[6]**

b) What is REL chart? Explain **[4]**

Q3) a) What is maintainability? What are different factors affecting maintainability? **[4]**

b) Explain MICLASS for Material Classification. **[6]**

OR

Q4) a) Explain any one layout optimization technique. **[4]**

b) Discuss Group Technology aspect in Plant Layout. **[6]**

Q5) a) What is preventive maintenance? Explain importance of preventive maintenance? **[8]**

b) Discuss role of periodic maintenance in any engineering company. **[8]**

OR

Q6) a) Explain scheduling maintenance in manufacturing industries. **[8]**

b) Explain Mathematical model for calculating life cycle cost. **[8]**

P.T.O.

Q7) a) Discuss Importance of safety in Manufacturing. **[8]**

b) Explain FMEA in detail. **[8]**

OR

Q8) a) Explain Accident preventive practice and codes. **[8]**

b) Discuss-safety against mechanical hazards. **[8]**

Q9) a) Explain the condition based maintenance with aid of vibration signature. **[10]**

b) What is Total Productive Maintenance? State merits and demerits of Total Productive Maintenance. **[8]**

OR

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

a) Reliability Centered Maintenance (RCM)

b) Overall effectiveness of equipment (OEE)

c) Condition based maintenance using SOAP

Total No. of Questions : 10]

SEAT No. :

P52

[Total No. of Pages : 4

[5871]-554

B.E. (Mechanical- Sandwich)
MECHANICAL VIBRATIONS
(2015 Pattern) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Classify mechanical vibrations. Give at least one engineering example of each type. **[4]**

b) A single-dof mass-spring system of mass 'm' and stiffness 'k' is subjected to the initial displacement of x_0 and initial velocity of v_0 and then allowed it to oscillate freely. Obtain an expression for displacement of the mass and hence find the amplitude in terms of x_0 and v_0. **[6]**

OR

Q2) a) Draw the time-displacement graph of free vibration of 1-dof viscously damped system for different damping conditions. **[4]**

i) Zero damping,

ii) Under damping,

iii) Critical damping and

iv) Over damping.

b) A block of mass 10 kg is placed on a horizontal surface and attached to a horizontal spring of stiffness 1200 N/m. The coefficient of sliding friction between the block and surface is 0.2. When the mass is given an initial displacement of 80 mm, calculate. **[6]**

i) The frequency of free oscillations.

ii) The number of cycles corresponding to 50% reduction in the initial amplitude

iii) The approximate time taken before the mass comes to at rest.

P.T.O.

Q3) a) Explain the transient state and steady state of vibration related to forced vibration. **[2]**

b) A machine of mass 25 kg is placed on an elastic foundation and is subjected to a sinusoidal force of amplitude 25 N. A frequency sweep reveals that the maximum steady state amplitude of 1.3 mm occurs at 4.5 Hz. Determine the equivalent stiffness of foundation and damping ratio of the system. **[8]**

OR

Q4) a) Draw self-explanatory frequency response curves for force transmissibility of 1 -dof vibration system. **[2]**

b) A rotor of 12 kg mass is mounted midway on a horizontal shaft of diameter 2.5 cm which is simply supported with a span of 90 cm in bearings at both the ends. The center of gravity of the rotor is 0.02 mm offset from its axis of rotation. The modulus of elasticity of shaft material is 200 GPa. Determine **[8]**

i) Static deflection of rotor

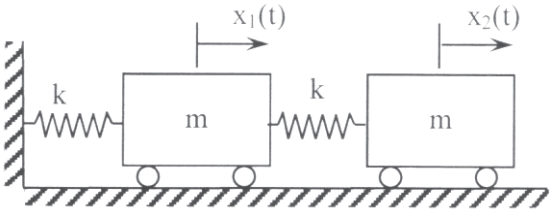
ii) Critical speed of shaft

iii) Amplitude of steady state vibrations of rotor and dynamic load on each bearing at a speed of 3000 rpm.

Q5) a) Explain two degree of freedom system with any two practical examples.

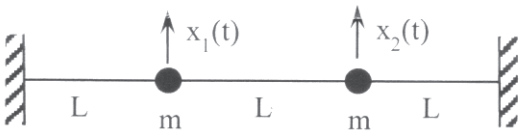
[4]

b) For the system of spring and masses shown in the figure, derive differential equations of motion in terms of displacement x_1 and x_2 of masses. Determine natural frequencies and corresponding mode shapes. Describe the mode shapes graphically. **[12]**



OR

Q6) Two equal masses of magnitude 'm' are attached to a light string of length 3L which is stretched with static tension 'T' between two supports as shown in figure. Assuming that the static tension 'T' is so high that the dynamic change in it is negligible due to small vertical displacements of masses. Derive differential equations of motion for small vertical displacements x_1 and x_2 of masses and determine natural frequencies and mode shapes. Describe the mode shapes graphically. **[16]**



Q7) a) Differentiate between static and dynamic balancing. Why there is a need of accurate dynamic balancing of high speed machines? **[4]**

b) Four masses A, B (10 kg), C (5.5 kg) and D (3.6 kg) are attached to a shaft at radii 0.1, 0.225, 0.15 and 0.15 m respectively. The planes in which the masses revolve are spaced 0.6 m apart. Determine the magnitude of mass A and relative angular position of all masses with respect to mass B to achieve the complete dynamic balance. **[12]**

OR

Q8) a) Explain the concept of partial balancing in single cylinder IC engine.**[4]**

b) A four stroke four cylinder inline engine has firing order of 1-4-2-3. The length of crank and connecting rod are 80 mm and 320 mm respectively. The angular position of cranks is at equal angles and engine cylinders are at 180 mm apart. The mass of reciprocating parts of each cylinder is 3 kg. Determine unbalanced primary and secondary forces and couples at a speed of 2000 rpm. **[12]**

Q9) a) Explain in brief various methods and techniques for vibration control. **[6]**

b) Explain with neat sketches the working principle of seismic sensor for vibration measurement. **[6]**

c) The static deflection of the vibrometer mass is 20 mm. The instrument when attached to machine vibrating with a frequency of 125 Hz, records the relative amplitude of 0.3 mm. Find the amplitude of displacement, velocity and acceleration of the machine vibration. **[6]**

OR

Q10)a) Explain with neat labeled sketches a typical arrangement of vibration measurement system. **[6]**

b) What is Dynamic vibration absorber? Explain working principle of undamped dynamic vibration absorber. **[6]**

c) Explain the method of vibration based condition monitoring of machines. **[6]**

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

P53 **[Total No. of Pages : 2**

[5871]-555
B.E. (Mechanical Sandwich)
COMPUTATIONAL FLUID DYNAMICS
(2015 Pattern) (Semester - II) (402068A) (Elective - I)

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

Instructions to the candidates:

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

Q1) a) Explain the physical boundary conditions of elliptical, parabolic and hyperbolic problem. **[6]**

b) Difference between conservation and non-conservation forms of fluid flow. **[4]**

OR

Q2) a) Write down the conservations equations in differential form and its signification. **[6]**

b) Derive the significance of the mass conservation equation in fluid mechanics **[4]**

Q3) a) State and explain the difference between explicit and implicit methods with suitable examples. **[4]**

b) Derive the discretized form of 2D unsteady state heat conduction problem. **[6]**

OR

Q4) a) Explain in details of boundary conditions of heat conduction problem by FVM **[6]**

b) What are the stability criteria in second order upwind (SOU) and QUICK **[4]**

P.T.O.

Q5) a) Write an expression for numerical solution of two dimensional heat convection diffusion system for slug flow using finite volume method. **[10]**

b) What is the difference between FDM over FVM? **[4]**

c) Define Peclet number and state its importance? **[4]**

OR

Q6) a) Derive finite volume discretized expression for two-dimensional unsteady heat convection-diffusion equation using suitable approach. **[10]**

b) Explain the significance of 1-D transient convection-diffusion system. **[8]**

Q7) a) Explain use of SIMPLE algorithm for solution of 2-D Navier Stokes equations **[10]**

b) Importance of Pressure correction method in SIMPLE algorithm. **[6]**

OR

Q8) a) Derive a solution of Navier Stokes equation for incompressible flow using SIMPLE algorithms for lid driven cavity flow problem. **[10]**

b) Explain the concept of external flow simulation in CFD. **[6]**

Q9) a) What is turbulence modeling? List out different types of turbulence modeling and its advantages and disadvantages. **[8]**

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

i) $k-\varepsilon$ turbulence model and

ii) k - ω turbulence model.

OR

Q10)a) Write in detail CFD analysis process for numerical solution of flow through pipe. **[6]**

b) Explain in details the Reynolds average Navier stokes (RANS) **[10]**

Total No. of Questions : 10]

SEAT No. :

P54

[Total No. of Pages : 2

[5871] - 556
B.E. (Mechanical - Sandwich)
CAD/CAM & AUTOMATION
(2015 Pattern) (Semester - II) (402068B) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q. 10.***
2) ***Figures to the right side indicates full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Use of Scientific Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) List different types of continuity. Explain slope and curvature continuity with neat sketch. **[5]**

b) Write a short note on degree elevation of Bezier curve. Also write importance of it. **[5]**

OR

Q2) a) A cubic Bezier curve is described by four control points: (0,0), (2, 1), (5, 2) and (6, 1). Find the midpoint of the curve. **[5]**

b) List different approaches in Computer Aided Process Planning (CAPP). Explain generative type CAPP system with neat sketch. **[5]**

Q3) a) Write a short note on DCLASS - CAPP system. **[5]**

b) What are the problems in implementation of traditional process planning? Explain role of Process Planning in CAD/CAM integration. **[5]**

OR

Q4) a) List and explain technical functions of four basic subsystems of CMPP-CAPP system. **[5]**

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

Q5) a) Explain types of fit with neat diagram. **[8]**

b) A medium force fit on a 75 mm shaft requires a hole tolerance and shaft tolerance each equal to 0.225mm and an maximum clearance of 0.0375mm. Determine the proper hole and shaft dimensions (maximum and minimum size) with hole basis system (means minimum hole diameter is 75mm).**[10]**

OR

P.T.O.

Q6) a) Explain in brief tolerance analysis and tolerance synthesis and its importance in manufacturing industries. **[8]**

b) The limits of mating hole and shaft are:

For the hole : 50 + 0.046 /- 0.000

For the shaft : 50 – 0.010/- 0.029

State the type of fit and find the allowance. What is the greatest possible amount of clearance or interference? **[10]**

Q7) a) What is Reverse Engineering. Explain its importance and scope. **[8]**

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

OR

Q8) a) How can we construct solid/ surface model through RE? Explain. **[8]**

b) What is CMM? Explain working principle of CMM with neat sketch. **[8]**

Q9) a) List Applications/tools for software reverse engineering. Explain any two. **[8]**

b) List and explain features that a RE tool should provide to reverse engineer real time embedded systems. **[8]**

OR

Q10)a) Explain Cloud Computing and Fog Computing. **[8]**

b) List and explain derived Qualities of Modern ICT. **[8]**

Total No. of Questions : 10]

SEAT No. :

P55

[Total No. of Pages : 4

[5871] - 557
B.E. (Mechanical/Sandwich)
FINITE ELEMENT ANALYSIS
(2015 Pattern) (Semester - II)(Elective - I) (402068C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No.7 or Q. No. 8, Q. No.9 or Q. No. 10.***
2) ***Figures to the right side indicates full marks.***
3) ***Draw the neat sketch wherever necessary.***

Q1) a) Explain Finite element analysis with basic steps? Also the difference between finite element method and finite difference method. **[6]**

b) Explain the Principal of Minimum Potential Energy. **[4]**

OR

Q2) a) Derive an expression for the element stiffness matrix of the two noded truss elements. **[4]**

b) For a stepped bar subjected to an axial compressive loads as shown in Figure 1, find stresses in each bar. Assume young's modulus of material of bar as 200 GPa. **[6]**

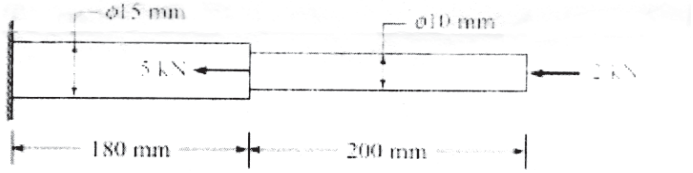


Figure 1 Stepped bar

Q3) a) Derive the expression for shape function for a two noded bar element taking natural coordinate 'ξ' as varying from –1 to 1. **[6]**

b) Explain in brief **[4]**

i) elimination Approach

ii) Penalty Approach

OR

Q4) a) Explain the concept of Plane Stress and Plane Strain in Finite Element Method. **[2]**

b) Explain the term Constant Strain Triangles (CST). **[2]**

P.T.O.

c) A CST element is defined by nodes at I (30,40), J (140,70), and K(80,140) and the displacements at these nodes are (0.1,0.5), (0.6,0.5) and (0.4,0.3) respectively. Determine the displacement in the natural coordinates and the shape function at point P (77,96) within the element. **[6]**

Q5) a) Explain concept of rigid body modes and constant strain rates and how it is ensured in isoperimetric formulations. Write down rules for isoperimetric formulations? **[8]**

b) Evaluate the following integrals using two point Gaussian quadrature method,

$$I = \int_{-1}^{1}\int_{-1}^{1} \left[r^2 + 2rs + s^2 \right] dr.ds$$ **[8]**

OR

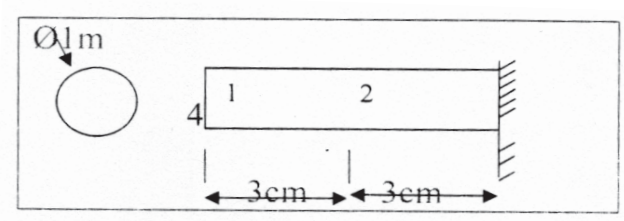
Q6) a) Explain the concept of mesh refinement? Explain the difference between p and h refinements. **[8]**

b) Explain the concept of isoparametric, sub parametric and super parametric elements and their uses. **[8]**

Q7) a) Write down governing equation of steady state heat transfer. Also write element stiffness matrix and compare it with bar element. **[8]**

b) A steel rod of 1cm diameter and length 6cm with thermal conductivity K=50W/m°C has temperature at left end equal to 400ºC. The surrounding temperature is 30ºC. The convection heat transfer coeffiecient is h= 20 W/mºC. The right end is insulated. Find temperature at x=3cm and x=6cm. use stiffness matrix as, **[8]**

$$K^e = \frac{KA}{L}\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} + \frac{hpL}{6}\begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix} + hA\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

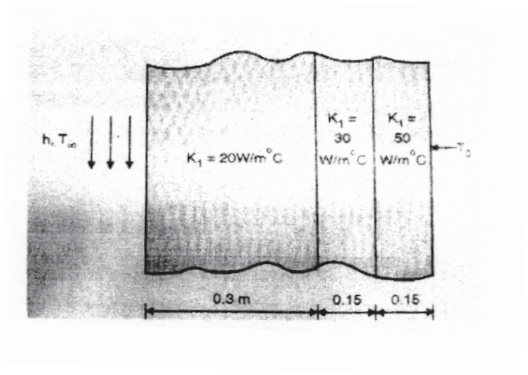


OR

Q8) a) Write a note on heat transfer through pin-fin, explain with appropriate governing equations. **[4]**

b) Derive FEA stiffness matrix for pin fin heat transfer problem. **[4]**

c) A composite wall consisting of three elements as shown in figure. The outer temperature is T_0 = 20°C, convection heat transfer takes place on the inner surface of the wall T_∞=800°C and h=25W/m2°C. Determine the temperature distribution in the wall. **[8]**



Q9) a) Explain the significance of lumped mass matrix and consistent mass matrix? **[4]**

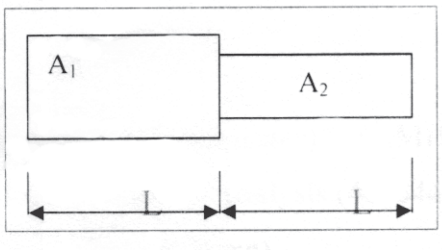
b) Write down, lumped mass matrix and consistent mass matrix for following elements, **[6]**

i) Bar element

ii) Plane truss element

iii) Triangular element.

c) Find the natural frequencies of longitudinal vibrations of the unconstrained stepped bar of cross sectional areas A and 2A, having equal step lengths as shown in figure, **[8]**

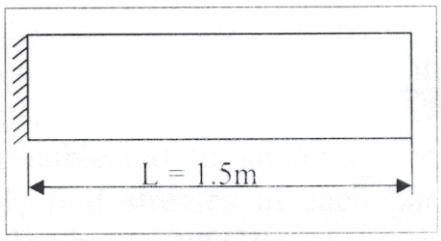


OR

Q10) a) What do you mean by the term, "dynamic analysis" ? Explain with basic types? **[4]**

b) Explain the difference between lumped mass matrix and consistent mass matrix techniques for modal analysis of structures. **[6]**

c) Estimate the natural frequencies of axial vibrations of bar as shown in figure using both consistent as well as lumped mass matrices and compare the results. The bar is having uniform cross section with area $A = 50\times10^{-6}m^2$, length L=1.5m, modulus of elasticity $E = 2\times10^{11}N/m^2$ and density $\rho = 7800kg/m^3$. Modal the bar using two/three elements. **[8]**



Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

[5871]-558

B.E. (Mechanical-Sandwich)

HYDRAULICS AND PNEUMATICS

(2015 Pattern) (Semester - II) (402068D) (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) ***Figure to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain any four desirable properties of hydraulic fluid. **[4]**

b) Explain construction and working of Balanced vane pump. **[6]**

OR

Q2) a) States types of Accumulators and Explain Dead weight Accumulator. **[6]**

b) What are the properties of Hydraulic fluids? **[4]**

Q3) a) Classify accumulators and represent the symbolically. **[4]**

b) A hydraulic cylinder supports of load of 2000 N and operating acceleration is l0m/s^2. Calculate the breakaway load and force required to bring the hydraulic cylinder to its operating force and speed. **[6]**

OR

Q4) a) Explain with symbols different centre positions of DCV. **[4]**

b) A cylinder is required to carry a load of 2000 kg. The load is to move along a horizontal surface with a speed of 20m/min. and it has to attain this speed and also stopped within 10mm travel. Determine the pressure. Assume $\mu = 0.15$, cylinder diameter = 50 mm. **[6]**

Q5) a) Write short note on "Regenerative Ckt.". **[8]**

b) Draw a neat sketch and explain working of Automatic reciprocating pneumatic circuit. **[8]**

OR

P.T.O.

Q6) a) Write short note on "Synchronization Ckt." **[8]**

b) Explain with neat sketch pressure relief valve and show its location in circuit. **[8]**

Q7) a) Explain in detail the advantages and applications of pneumatics in industrial Automation. **[8]**

b) Write short note on "Mufflers lubricators & Air Dryers" used for pneumatic system. **[8]**

OR

Q8) a) Write selection criteria and troubleshooting for compressors. **[8]**

b) Explain in brief with the help of a neat sketch the working of a lubricator unit used in pneumatic system. **[8]**

Q9) a) Explain Design parameter considerations for designing a Hydraulic system. **[6]**

b) A machine tool slide is moved by means of a hydraulic cylinder as follows.

i) Initially it moves through a distance of 200mm against an effective load of 12kN in about 3sec.

ii) It is followed by a working stroke of 100 mm against an effective load of 35 kN. The feed rate during this part of the stroke is required to be between 0.5 to 1 m/min.

iii) The return stroke is as fast as possible. A meter out type of circuit is used. Draw a circuit. Select different components used in the circuit from the data tables. **[12]**

OR

Q10) a) Explain different methods of vacuum measurement. **[4]**

b) A 50 KN hydraulic press has stroke of 1m. The main ram is required to move down with velocity of about 5m/min for the first 80cm against a negligible load. The ram is slowed down to a velocity of 2m/min for the next 12 cm against load of I 2kN, followed by the working stroke of last 8 cm developing a maximum force of 50kN. The cylinder is returned as quickly as possible and is to be held at the top most position.

Draw a circuit which will fulfil these requirements. Select the different components used in the circuit from the data tables. Mention the rating of components in case it is not available in the given data. **[14]**

DATA

1. SUCTION STRAINER:

Model	Flow capacity (lpm)
S1	38
S2	76
S3	152

2. PRESSURE GAUGE:

Model	Range (bar)
PG1	0-25
PG2	0-40
PG3	0-100
PG4	0-160

3. VANE PUMP:

Model	Delivery (lpm)		
	at 0 bar	at 35 bar	at 70 bar
P1	8.5	7.1	5.3
P2	12.9	11.4	9.5
P3	17.6	16.1	14.3
P4	25.1	23.8	22.4
P5	39	37.5	35.6

4. RELIEF VALVE:

Model	Flow range (lpm)	Max. working pressure (bar)
R1	11.4	70
R2	19	210
R3	30.4	70
R4	57	105

5.FLOW CONTROL VALVE:

Model	Max. working pressure (bar)	Flow range (lpm)
F1	70	0-4.1
F2	105	0-4.9
F3	105	0-16.3
F4	70	0-24.6

6. DIRECTION CONTROL VALVE:

Model	Max. working pressure (bar)	Flow capacity (lpm)
D1	350	19
D2	210	38
D3	210	76

7. CHECK VALVE

Model	Max. working pressure (bar)	Flow capacity (lpm)
C1	210	15.2
C2	210	30.4
C3	210	76

8. SEQUENCE VALVE

Model	Max. working pressure (bar)	Flow capacity (lpm)
PO1	210	19
PO2	210	38
PO3	210	76

9. CYLINDER (Max. working pressure -210)

Model	Bore Dia. (mm)		Rod Dia. (mm)
A1	25		12.5
A2	40		16
A3	50		35
A4	75		45
A5	100		50

10. OIL RESERVOIR:

Model	Capacity (lit)
T1	40
T2	100
T3	250
T4	400
T5	600

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

[5871]-559

B.E. (Mechanical Sandwich)

ENERGY AUDIT & MANAGEMENT

(2015 Pattern) (Elective - II) (402069A) (Semester - II)

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

Instructions to the candidates:

1) ***Answer full questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Answers should be written in same answer book.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicates full marks.***
5) ***Use of log tables, slide rules, mollier charts, electronic calculator and steam table is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Write a note on Indian Energy consumption pattern. **[6]**

b) Write a short note on energy and environment. **[4]**

OR

Q2) a) What is energy conservation and energy efficiency? **[6]**

b) List down any five Designated Consumers notified under the Energy Conservation Act. **[4]**

Q3) In the washing process of an automobile plant, electricity is being used to heat 5000 litres/hr. of water by 8°C. The industry is planning to convert from Electrical heating to LPG heating. **[10]**

Other Parameters : Annual operating hours = 6000 hours, Efficiency of indirect heating with LPG = 85%, Efficiency of electrical heating = 95%. Calorific value of LPG = 12,000 kcal/kg, Landed cost of LPG = Rs. 60/kg, Cost of electricity = Rs. 8/kW.

If electrical heating is replaced with LPG heating, with an investment is Rs. 15 lakhs, compute the simple payback period.

OR

P.T.O.

Q4) In an industry, an electrical oven consuming 1100 kWh/batch,is proposed for replacement, by a FO fuel fired oven. Calculate the simple payback period, given the following data: **[10]**

Number of batches / years = 4000

Efficiency of electric oven = 82%

Efficiency of FO fired oven = 55%

Cost of FO = Rs. 35,000/Tonne

GCV of FO = 10,200 kcal/kg

Electricity cost = Rs. 6.0/kWh

Investment for FO fired oven = Rs. 125 Lakhs

Q5) a) Explain the working principle of thermodynamic trap. **[8]**

b) An economizer was installed in an oil-fired boiler. The following data was obtained after commissioning the economizer. **[10]**

- Air to fuel ratio = 18
- Evaporation ratio of the boiler = 12.5
- Specific heat of flue gas = 0.25 kcal/kg°C
- Condensate recovery in the plant = Nil.

Calculate the rise in temperature of feed water across the economizer, corresponding to a drop in flue gas temperature from 280°C to 190°C.

OR

Q6) a) List energy saving measures in a centralized chilled water based air conditioning system. **[8]**

b) In a double pipe heat exchager, flow rates of the hot and the cold-water streams flowing through a heat exchanger are 10 and 25 kg/min, respectively. Hot and cold-water stream inlet temperatures are 70°C and 27°C, respectively. The exit temperature of the hot stream is required to be 50°C. The specific heat of water is 4.179 kJ/kg K. The overall heat transfer coefficient is 900 W/m^2 K. Neglecting the effect of fouling, calculate the heat transfer area for **[10]**

i) Parallel-flow ii) Counter-flow

Q7) a) What is standard labelling program? List the equipment and appliances covered under Standards and Labelling program. **[8]**

b) Write note on Lamp types and their features. **[8]**

OR

Q8) a) Write note on electrical motors with their types and applications. **[8]**

b) What is power factor in power distribution system? List the benefits of power factor improvement in an industrial power distribution system.**[8]**

Q9) a) What are the important technical parameters for selection of cogeneration system? **[8]**

b) With a suitable diagram explain the principal of working of Heat Wheel. **[8]**

OR

Q10) a) Write a note on CDM projects and Carbon credit calculations. **[8]**

b) Write a note on PRV and Microturbine. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P58

[Total No. of Pages : 4

[5871]-560

B.E. (Mechanical-Sandwich)
OPERATIONS RESEARCH
(2015 Pattern) (Elective - II) (402069B) (Semester - II)

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

Instructions to the candidates:

1) ***Solve Q1 or Q2, Q3 orQ4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of a Scientific Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Use big-M simplex method to minimize, $Z = 5X_1 + 6X_2$. **[10]**

Subject to $2X_1 + 5X_2 \geq 1500;$

$3X_1 + X_2 \geq 1200$ Where; $x, y \geq 0$

b) Reduce the following Game by Dominance and determine the value of the game in the table below. **[10]**

Person B

Person A	1	2	3	4
1	3	2	4	0
2	3	4	2	4
3	4	2	4	0
4	0	4	0	8

OR

Q2) a) Solve the following transportation problem. Use Vogel's Approximation Method to find an initial basic feasible solution and a stepping stone method to optimality the solution. **[10]**

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

b) Solve by simplex method: **[10]**

Maximize $z = 3x_1 + 2x_2$

$x_1 + x_2 <= 4;\ \ x_1 - x_2 <= 2$

$x_1, x_2 > 0$

P.T.O.

Q3) a) Table shows the manpower requirements for each activity in a project. **[12]**

i) Draw the network diagram of the project activities.

ii) Rearrange the activities suitably for reducing the existing total manpower requirements.

iii) If only 9 men are available for the execution of the project, then rearrange the activities suitable for leveling the manpower resource.

Activity	Normal time	Manpower required
0-1	2	4
1-2	3	3
1-3	4	3
2-4	2	5
3-5	4	3
3-6	3	4
4-7	6	3
5-7	6	6
6-8	5	2
7-9	4	2
8-9	4	9

b) What is looping error and Dangling errors in the network? **[4]**

OR

Q4) a) The time estimates (in week) for the activities of a PERT network are given below: **[12]**

Activity	t_o	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw to project network and identify all the paths through it.

ii) Determine expected project length.

iii) Calculate the standard deviation and variance of the project length.

iv) What is the probability that project will be completed at least 4 weeks earlier than expected time?

v) If the project due date is 19 weeks, what is the probability of not meeting the due date?

vi) What should be the scheduled completion time for the probability of completion to be 90%?

b) Explain significance of PERT and CPM. **[4]**

Q5) a) There are seven jobs, each of which has to go through two machines A and B in the order AB. The processing times in hours are as follows: **[8]**

Job →	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine the sequence of these jobs that will minimize the total elapsed time T. Also find T and idle time for machines A and B.

b) Solve the following sequencing problem by giving an optimal solution when passing out is not allowed. **[8]**

	Job				
Machines	A	B	C	D	E
M1	11	13	9	16	17
M2	4	3	5	2	6
M3	6	7	5	8	4
M4	15	8	13	9	11

OR

Q6) a) Find an optimal sequence for the following sequencing problems of four jobs and five machines when passing out is not allowed of which processing time (in hours) is given below. Also find the total elapsed time. **[8]**

	Machines				
Job	M1	M2	M3	M4	M5
A	7	5	2	3	9
B	6	6	4	5	10
C	5	4	5	6	8
D	8	3	3	2	6

b) There are 5 jobs each of which is to be processed through machines A, B and C in the order A-B-C. The processing time in hours is given below: **[8]**

	Jobs				
Machines	1	2	3	4	5
Machine A	3	8	7	5	4
Machine B	4	5	1	2	3
Machine C	7	9	5	6	10

Q7) a) In a cargo loading problem, there are 4 items of different weight/unit and different value/units as given in the table: **[12]**

Item (i)	Weight/unit (wi, kg/unit)	Value/unit (Pi, Rs./unit)
1	1	1
2	3	5
3	4	7
4	6	11

The maximum cargo load is restricted to 17. How many units of each item be loaded to maximize the value?

b) Explain in the brief the dynamic programming model. **[6]**

OR

Q8) a) A firm has divided its marketing area into three zones. The amount of sales depends upon the number of salesmen in each zone. The firm has been collecting data regarding sales and salesmen in each area over a number of past years. **[12]**

The information is summarized in the following table. For the next year firm has only 9 salesmen and the problem is to allocate these salesmen to three different zones so that the total sales are maximum.

No. of salesmen	Profit in thousands of rupees		
	Zone 1	Zone 2	Zone 3
0	30	35	42
1	45	45	54
2	60	52	60
3	70	64	70
4	79	72	82
5	90	82	95
6	98	93	102
7	105	98	110
8	100	100	110
9	90	100	110

b) Explain the methodology used in the cutting plane method. **[6]**

Total No. of Questions : 9]

SEAT No. :

P59

[Total No. of Pages : 3

[5871]-561
B.E. (Automobile)
AUTOMOTIVE REFRIGERATION & AIR-CONDITIONING
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. and Q.9 is compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use steam table and psychrometric chart is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) A cold storage of 120 TR capacity operates between the temperature limits of –30°C. (minus 30°C) and + 30°C. The refrigerant at the suction of compressor is dry saturated and at the exit of condenser it is subcooled by 10°C. The actual COP is 70% of the theoretical. Find the following : **[6]**

i) Actual & theoretical COP

ii) Mass flow rate of refrigerant in kg/min.

iii) Compressor power

Properties of refrigerant are : C_{pv} = 0.55kJ/kgK & C_{pl} = 1.19kJ/kgK

T_{sat} °C	p(bar)	h_f (kJ/kg)	S_f (kJ/kgK)	S_g (kJ/kg.k)
–30	1.6	166.2	0.87	1.803
30	12	236.8	1.13	1.712

b) Derive expression for COP of heat pump working on reverse Carnot cycle. **[4]**

OR

Q2) a) Derive expression of Ideal COP of vapor absorption refrigeration system. **[6]**

b) Discuss with T-S diagram the effect of superheating the refrigerant gas before entering in compressor in vapour compression system. **[4]**

Q3) a) Discuss required properties of refrigerants in detail. **[6]**

b) Explain with neat sketch evaporative type condenser. **[4]**

OR

P.T.O.

Q4) Explain various air distribution modes in detail. **[10]**

Q5) a) Explain following properties of air : **[8]**

i) Specific humidity

ii) DPT & Dew point depression

iii) Partial pressure of vapour

iv) WBT & Wet bulb depression

b) On a particular day, The atmospheric air was found to have a DBT of 30°C and WBT of 18°C. The barometric pressure was observed to be 756 mm of Hg. Find following properties, without using psychrometric chart. **[8]**

i) Partial pressure of water vapour

ii) Relative humidity

iii) Specific humidity

iv) Dew point temperature

OR

Q6) a) Derive an expression for By-pass factor of heating coil. Also explain ADP of cooling coil. **[8]**

b) 500m^3/min of fresh air at 30°C DBT and 50% RH is adiabatically mixed with 1000m^3/min of recirculated air at 22°C DBT and 10°C DPT. Calculate the enthalpy. Specific humidity, specific volume and DBT of mixture. **[8]**

Q7) An air conditioning system is to be used for a restaurant with the following data : **[16]**

Outside design condition = 40°C DBT, 28°C WBT,

Inside design condition = 25°C DBT, 50% RH,

Solar heat gain through walls, roofs, floor = 5.87kW,

Solar heat gain through glass = 5.52 kW, No. of Occupants = 25,

SH gain per person = 58W, LH gain per person = 60 W,

Internal lighting load = 15 lamps of 100W and 10 fluorescent tubes of 80W,

SH gain from other sources = 11.60kW. Infiltration air = 15m^3/min.

If 25% fresh air and 75% recirculated air is mixed and passed through the conditioner coil, find the following :

a) The dew point temperature of coil

b) The condition of supply air to the room

c) The amount of total air required in m^3/hr.

d) Capacity of cooling coil.

OR

Q8) The bus sensible and latent heat load for air-conditioned space are 25kW and 5kW respectively. The room conditions are 25°C DBT & 50% RH. The outer condition is 40°C DBT & 50% RH. The ventilation requirement is such that 20% fresh air is mixed with supply air. BPF of cooling coil is 0.15. **[16]**

Determine :

a) Supply air flow

b) Outside air sensible heat

c) Outside air latent heat

d) Grand total heat

Q9) Write a short notes on (any three) : **[18]**

a) Refrigerant compressor servicing

b) A/C system leak testing

c) Sensors & actuators used in AC system

d) Refrigerant system flushing and odour removal

e) Refrigerant recovery and retrofitting

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

P60 **[Total No. of Pages : 2**

[5871]-562

B.E. (Automobile Engineering)

ALTERNATIVE FUELS AND EMISSION CONTROL

(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No. 2, Q.No.3 or Q.No.4, Q.No.5, or Q. No.6, Q.No.7 or Q.No.8, Q.No.9 or Q.No.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Describe the desirable properties of fuels in IC engine. **[5]**

b) Explain the various factors affecting on combustion technology of IC engine. **[5]**

OR

Q2) a) Summarize the negative effects of NOX and CO pollutants on human being. **[5]**

b) What are the modifications required to use Biodiesel as alternative fuel for Cl Engine. **[5]**

Q3) a) Compare the properties of Bio gas and CNG as an alternative fuel for IC engine. **[5]**

b) Describe the ethanol as alternative fuel for IC engine. **[5]**

OR

Q4) a) Define wall quenching and explain the effects of wall quenching on SI engine emission. **[5]**

b) Explain the types and causes of smoke formation in diesel engine. **[5]**

P.T.O.

Q5) a) Explain with neat sketch constructional and operational features of Flame Ionization Detector (FID) for measurement of HC concentration. **[8]**

b) Describe the Bharat stage emission standard norms for diesel heavy duty vehicles. **[8]**

OR

Q6) a) Draw and explain the urban (ECE) and extra urban European (EUDC) driving test cycle for vehicles. **[8]**

b) Why Vehicle Emission Standard (VES) is necessary? Discuss the various objectives of VES. **[8]**

Q7) a) Justify your answer, how to assist variable swept volume technology in emission control with its advantages. **[8]**

b) Explain in detail how to affects engine design parameters on SI engine emission control. **[8]**

OR

Q8) a) Explain with neat sketch constriction and working of Positive Crankcase Ventilation (PCV) system. **[8]**

b) What are the requirements of Catalyst Substrate? Explain the characteristics of ceramic monoliths catalyst. **[8]**

Q9) a) Explain the various factors affecting on performance of three way catalytic convertor (TWC) **[6]**

b) Suggest the various hydrocarbon emission reduction techniques in IC engine. **[6]**

c) Discuss the advantages and disadvantages of Electronic Fuel Injection (EFI) System. **[6]**

OR

Q10)a) Write the functions and explain construction of wash coat in catalytic converter. **[6]**

b) Discuss in detail role of diesel particulate filter (DPF) in emission control of CI engine. **[6]**

c) Explain the performance advantages and disadvantages of CRDI system. **[6]**

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

P61 **[Total No. of Pages : 3**

[5871]-563

B.E. (Automobile Engineering)

MACHINE AND VEHICLE DYNAMICS

(2015 Pattern) (Semester - I) (416490)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or 10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) A shaft carries four masses A, B, C, and D of magnitude 200kg, 300kg, 400kg and 200kg respectively and revolving at radii 80mm, 70mm, 60mm and 80mm in planes measured from A' at 300mm, 400mm and 700mm The angles between cranks measured anticlockwise are A to B 45°, B to C 70°, and C to D 120°. The balancing masses are to be placed in plane X and Y. The distance between the planes A and X is 100mm, between X and Y is 400mm and between Y and D is 200mm. If the balancing masses revolve at a radius of 100mm, find their magnitudes and angular positions. **[10]**

OR

Q2) a) Explain the method of direct and reverse crank to determine the unbalance force in radial engines. **[6]**

b) What do you mean by balancing machines? Describe any one type of a static balancing machine. **[4]**

Q3) Derive the general equation for forced vibration due to harmonic excitation. **[10]**

OR

P.T.O.

Q4) a) A Horizontal spring mass system with coulomb damping has a mass of 5 kg attached to a spring of stiffness 980 N/m. If the coefficient of friction is 0.025, calculate **[6]**

i) The frequency of free oscillations

ii) The number of cycles corresponding to 50% reduction in amplitude if the initial amplitude is 5cm and

iii) The time take to achieve this 50% reduction

b) Describe fluid dashpot and eddy current damping with the help of neat sketch. **[4]**

Q5) a) State the equation for Tractive effort and Power available at road wheels and explain each term. **[9]**

b) Explain dynamic axel load with the help of neat sketch. **[9]**

OR

Q6) a) Explain following in details: **[9]**

i) Earth fix coordinator

ii) Gradability

iii) Drawbar pull

b) Which are the various coordinates systems use in vehicle dynamics? Explain in details. **[9]**

Q7) a) A brake force of 1000N is applied to a vehicle having weight 300kg in order to stop from 100km/hr. Determine: **[10]**

i) Maximum Deceleration

ii) Stopping distance

iii) Time to stop the vehicle

iv) Power absorbed during braking

b) Describe Traction limited acceleration. **[6]**

OR

Q8) a) Derive the equation for calculating effective inertia of Transmission. **[10]**

b) Explain ABS in details. **[6]**

Q9) a) Explain active and semi active suspension. **[8]**

b) Describe mathematical model for ride and excitation source. **[8]**

OR

Q10)a) Explain neutral steer, under steer and over steer. **[8]**

b) Describe following : **[8]**

i) Lateral acceleration gain

ii) Constant radius testing

❍❍❍❍

Total No. of Questions : 10]

SEAT No. :

P62

[Total No. of Pages : 2

[5871]-564

B.E. (Automobile Engineering)

FUNDAMENTALS OF COMPUTATIONAL FLUID DYNAMICS

(2015 Pattern) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write short note on Couette flow equation. **[4]**

b) Write short note on Strengths and Weakness of CFD. **[6]**

OR

Q2) a) State and explain types of grid generation. **[4]**

b) Explain Euler's model **[6]**

Q3) a) Write down a formula for Finite difference approximation using Taylor series (first order). **[2]**

b) Write short note on Alternating Direction implicit method (ADI). **[8]**

OR

Q4) a) Explicit approaches. **[2]**

b) Explain Solution of two dimensional steady and unsteady heat conduction equation with Dirichlet. **[8]**

Q5) a) What is Peclet number? State its Significance. **[8]**

b) Derive First order wave equation with Mac Cormac scheme. **[8]**

OR

Q6) a) Write in brief about Lax Wendroff method and its stability criteria. **[8]**

b) Explain 1D steady Convection Diffusion system. **[8]**

P.T.O.

Q7) a) Write applications of flow through pipe. **[9]**

b) Explain Finite volume method. **[9]**

OR

Q8) Write difference between SIMPLE, SIMPLER, SIMPLEC algorithm with the help of Navier stroke equation. **[18]**

Q9) a) Explain following solver models **[8]**

i) K- €

ii) K-w

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

i) Control residual in any CFD tool

ii) Setup solver for obtaining plots for analysis

OR

Q10)Write short on **[16]**

i) Steps in pre-processing

ii) Introduction to turbulence models.

iii) Geometry creation

iv) Reynolds Averaged Navier-Stokes equations

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

P63 **[Total No. of Pages : 4**

[5871]-565

B.E. (Automobile Engineering)

FUNDAMENTALS OF FINITE ELEMENT ANALYSIS

(Semester - I) (Elective - I) (2015 Pattern)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat labelled 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 meshing in FEA. **[6]**

b) Find the stresses in the below bar shown in fig.(1), due to the forces10KN, and 5KN. Use below data. **[8]**

A1 = 150mm^2 1_1= 50mm E_1= 200GPa

A_2= 100mm^2 1_2= 50mm E_2 = 70GPa

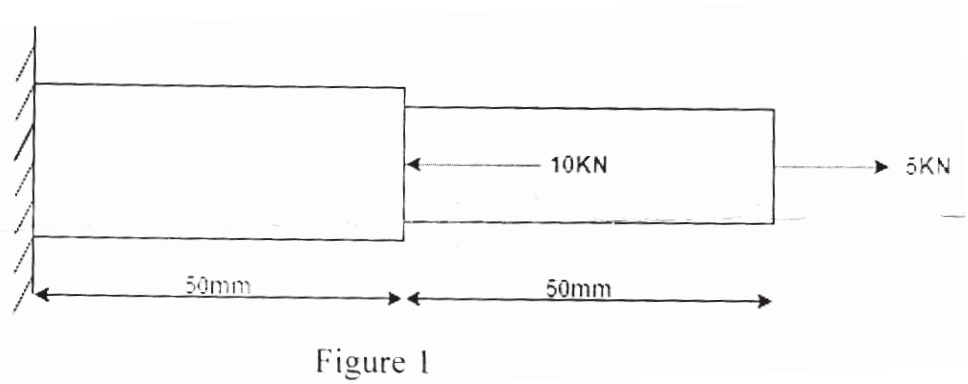

Figure 1

c) Write and Explain the Principle total potential energy approach in finite element analysis **[6]**

OR

P.T.O.

Q2) a) Explain the 'Weighted residual approach' in finite element analysis. **[6]**

b) Find the nodal displacement of truss structure shown in fig (2). Take E = 200Mpa and A = 1500mm^2. **[8]**

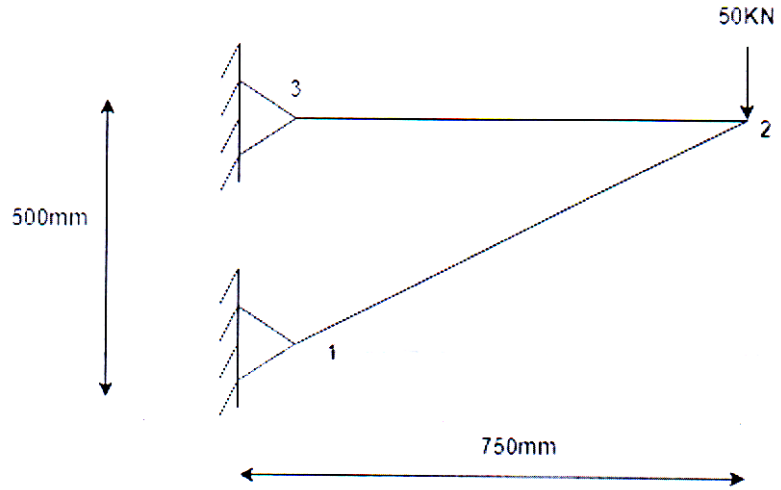

Figure 2

c) Write the short note on **[6]**

i) 2D elements

ii) Axi-symmetrical Element

Q3) a) Explain the following terms **[8]**

i) iso-parametric elements

ii) Sub parametric elements

iii) Super parametric elements

iv) Sub modelling

b) Evaluate the integrals using three points Gaussian quadrature method. **[10]**

i) $\int_{-1}^{1}\left(e^{x}+x^{3}+x^{23}\right)dx$

ii) $\int_{-1}^{1}\left(e^{x}-x\right)dx$

OR

Q4) a) Derive the shape function of 3 node bar element using iso-parametric formulation. **[8]**

b) For a point P located inside the triangle, as shown in fig (3), find the shape function. **[10]**

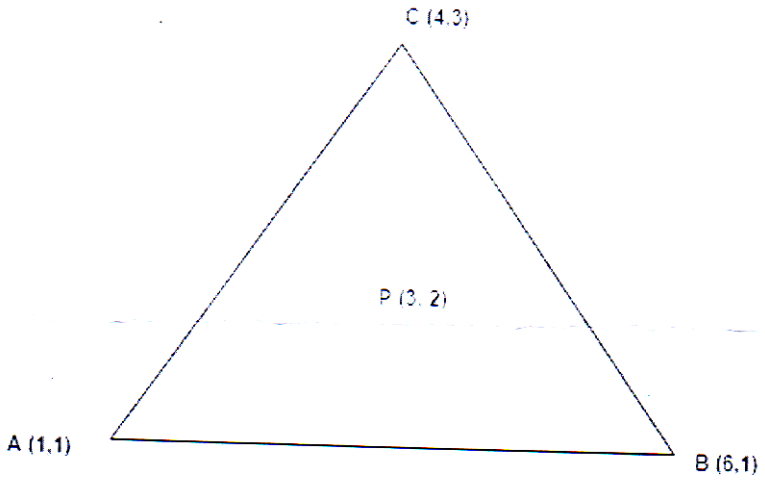

Figure 3

Q5) a) Formulate the 1 D steady state conduction heat transfer equation using the Galerkin approach. **[8]**

b) A composite wall consisting of two material shown in figure (4). The outer temperature is T_0 =20°C, convection heat transfer takes place on inner wall T∞ = 800°C and h = 25W/m²°C. Determine the temperature distribution in wall. **[8]**

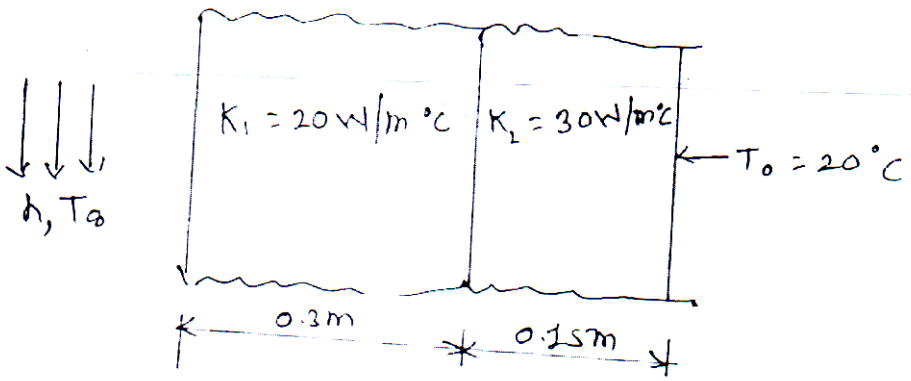

Figure 4

Q6) A metallic fin, with thermal conductivity 70 W/m °K, 1cm radius and 5cm long extends from a plane wall whose temperature is 140°C. Determine the temperature distribution along the fin if heat is transferred to ambient air at 20°C with heat transfer coefficient of 5 W/m^2K. Take two elements along the fin. **[16]**

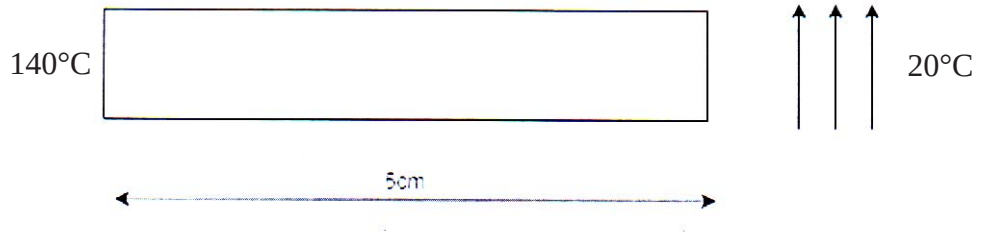

Figure 5

Q7) a) Formulate the lumped mass matrices for 1 D bar element. **[8]**

b) Find the natural frequency of bar shown in figure (6), using consistent and lumped mass matrix method. Use one element for bar. Take modules elasticity of E=200GPa, density of material $\rho = 7800kg/m^2$ and length of rad l = 2m **[8]**

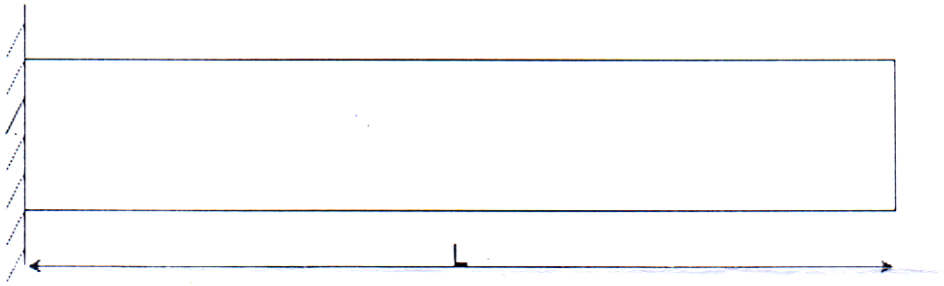

Figure 6

OR

Q8) a) Explain the difference between lumped mass matrix and consistent mass matrix. **[8]**

b) Write the notes on error analysis. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P64

[Total No. of Pages : 4

[5871]-566

B.E. (Automobile Engineering)

CAE & AUTOMATION

(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

Q1) a) Compare CSG & B-rep. Explain the various Boolean operations used in CSG with neat sketch. **[5]**

b) A line joins two points (3,4,6) and (5,7,1) Find **[5]**

i) Parametric equation of line

ii) Tangent vector of the line

iii) Unit vector in the direction of line

OR

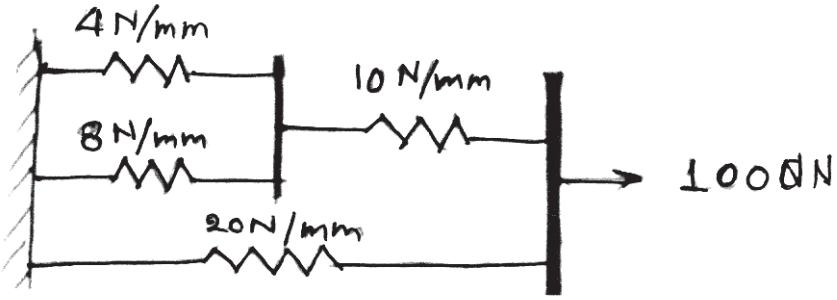
Q2) a) Explain the significance of Inverse Transformation & write down the inverse transformation matrices for. **[5]**

i) Translation ii) Rotation

b) A circle is passing through two end points A(6, 4) and B(10,10) where AB is the diameter of the circle. Find the co-ordinates of the center point. Radius and parametric eq^{n} of circle. Also find the co-ordinates of points on the circle at T = 30° and T= 120°. **[5]**

P.T.O.

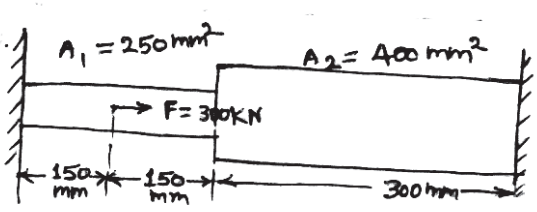
Q3) a) Figure shows a cluster of four springs one end of the assembly is fixed and a force of 100N applied at the other end using FEM determine the deflection of each spring. **[5]**



b) What do you understand by concatenated transformation? **[5]**

OR

Q4) A stepped steel bar (E = 200 × 10_3 N/mm_2) is subjected to an axial load of 300 kN as shown in figure. **[10]**



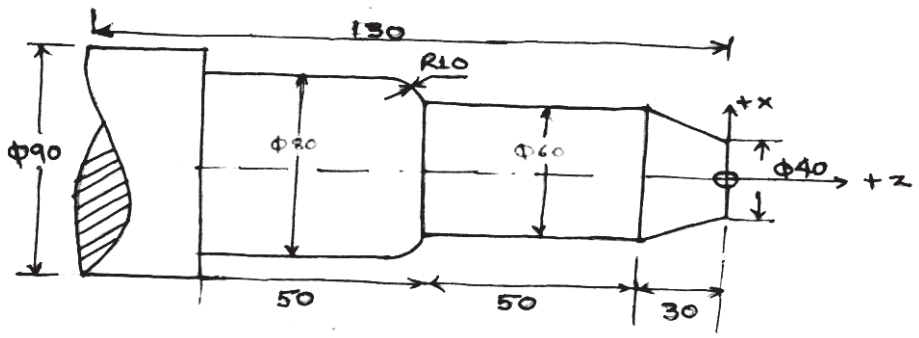
Using FEM, determine,

a) Nodal displacement

b) Stress in each element

c) Reaction forces at support

Q5) a) Develop a part program using G and M code to turn MS Job of size ϕ80 × 120 mm long as shown in figure. Assume suitable cutting parameters and various canned cycles to turn the final shape from the raw material of size ϕ90 × 130 mm. **[10]**

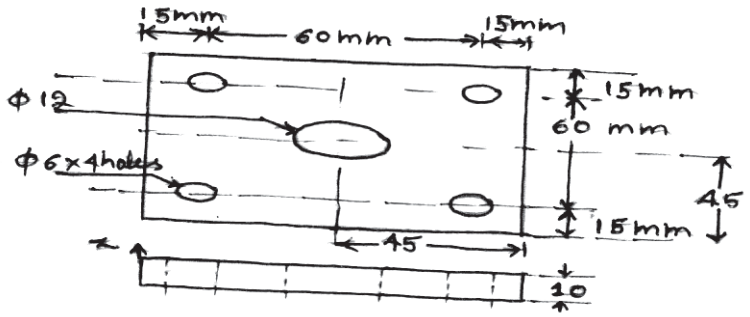


b) List the different techniques of Rapid prototyping. Explain any one R.P. Technique in detail with neat sketch. **[8]**

OR

Q6) a) What is DNC? Explain the elements of DNC. Describe limitations of DNC. **[6]**

b) Write a part program to drill the holes in a component as shown in figure using CNC milling machine. Take cutting speed (v) = 60 m/min& feed (f) = 0.5 mm/tooth. Assume twisted drill with one complete helix teeth (z = 1). **[12]**



Q7) a) What is Group Technology? Describe OPTIZ coding system in detail. **[8]**

b) What is FMS? Explain different elements of FMS. **[8]**

OR

Q8) a) What is automation? Compare the types of Automation on the basis of. **[8]**

i) Initial Investment

ii) Production rate

iii) Flexibility

iv) Production system

v) Tool setup

b) Write short note on AGV. Write down advantages and disadvantages of AGV. **[8]**

Q9) a) State and explain parameters used in robot specifications. **[8]**

b) What is Gripper? State different types of grippers. Explain any one gripper in detail with neat sketch. **[8]**

OR

Q10) Write short note on, **[16]**

a) Robot programming Languages

b) Sensors used in robots

c) Application of robot in Industry

d) Methods of robot programming

Total No. of Questions : 10]

SEAT No. :

P65

[Total No. of Pages : 2

[5871] - 567

B.E. (Automobile Engineering)

SPECIAL PURPOSE VEHICLE

(2015 Pattern) (Semester - I) (416492A) (Elective - II)

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

Instructions to the candidates :

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

Q1) a) Define off road vehicle. Explain the applications and construction layout of an off Road vehicle. **[8]**

b) Explain about power plant used in road construction. **[8]**

OR

Q2) a) Compare crawler mounted tractor and wheel mounted tractor. **[6]**

b) Explain the construction and working of dipper shovel. **[10]**

Q3) Explain the constructional layout of Dragline. **[4]**

OR

Q4) Explain the constructional layout of scraper. **[4]**

Q5) a) With neat sketch explain the construction and working of Grader. **[10]**

b) Differentiate between transmission drive P.T.O. and Independent drive P.T.O. **[8]**

OR

Q6) Write a short note on : **[18]**

a) Gun Carriers

b) Transport vehicles

c) Pulverizes & Rollers

P.T.O.

Q7) a) Explain power steering system of the vehicle. **[8]**

b) Explain OCDB and dry disc caliper brake system of the vehicle. **[8]**

OR

Q8) a) Explain about the agricultural implements with neat sketches. **[8]**

b) Narrate the design aspects of Loader bucket. **[8]**

Q9) a) What are the factors affecting traction performance? Explain. **[8]**

b) Explain the types of soil and list the different properties. **[8]**

OR

Q10) Explain the following : **[16]**

a) Soil-Vehicle Mechanics

b) Mobility Index (MI)

c) Vehicle Cone Index (VCI)

d) Rated Cone Index (RCI)

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

P66

[Total No. of Pages : 2

[5871] - 568

B.E. (Automobile Engineering)

VEHICLE MAINTENANCE

(2015 Pattern) (Semester - I) (416492B) (Elective - II)

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

Instructions to the candidates :

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

Q1) a) List out the importance of maintenance. **[4]**

b) Illustrate a typical maintenance log sheet of an automobile. **[6]**

OR

Q2) a) What is trip sheet? **[4]**

b) Distinguish between preventive and breakdown maintenance. **[6]**

Q3) a) Name the different record form used in maintenance. **[4]**

b) What are the safety precautions to be made during the maintenance of a vehicle? **[6]**

OR

Q4) a) Describe maintenance and overhauling of cylinder and valves? **[4]**

b) Differentiate preventive maintenance from breakdown maintenance. **[6]**

Q5) a) Explain cylinder honing process. **[8]**

b) Explain bleeding of brake. **[8]**

OR

Q6) a) Write the step-by-step procedure of overhauling a multi-cylinder petrol engine. **[8]**

b) What is the procedure for testing connecting rod for bend and twist? **[8]**

P.T.O.

Q7) a) What is meant by clutch pedal free play? What are the effects of incorrect adjustment of it? **[8]**

b) Mention two main reasons for gear slip of a vehicle. **[8]**

OR

Q8) a) Explain briefly about the maintenance of alternators. **[8]**

b) Explain cylinder compression tester. **[8]**

Q9) a) Explain On-board diagnosis. **[10]**

b) Explain brakes adjustments & maintenance. **[8]**

OR

Q10) a) Explain the procedure for road testing of a passenger car. **[10]**

b) Explain the various failures in the cooling system and discuss the causes and remedies for them. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P67

[Total No. of Pages : 2

[5871] - 569

B.E. (Automobile Engineering)

PRODUCT DESIGN AND DEVELOPMENT

(2015 Pattern) (Semester - I) (416492C) (Elective - II)

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

Instructions to the candidates :

1) ***Solve Five Questions Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***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 details. **[10]**

OR

Q2) Explain product testing. Product Validations product verification. **[10]**

Q3) Explain product information gathering, brainstorming and lateral thinking. **[10]**

OR

Q4) What is a concept selection? Explain Pugh's chart with example. **[10]**

Q5) Explain Product Teardown Process. Discuss force flow diagram. **[16]**

OR

Q6) Explain Benchmarking approach and tools used in benchmarking. **[16]**

Q7) a) Explain the Industrial Design Process. **[9]**

b) Explain Design for Environment Guidelines. **[9]**

OR

P.T.O.

Q8) a) Explain manufacturing cost analysis and stepwise procedure for estimation of cost. **[9]**

b) Discuss Environmental Impacts & Environmental Process. **[9]**

Q9) a) Discuss product, process, peoples and methods as components of PLM. **[8]**

b) Explain Different Phases of Product Life Cycle. **[8]**

OR

Q10) Explain product data management with reference to **[16]**

a) Components.

b) Benefits &

c) Features

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

P68

[Total No. of Pages : 2

[5871] - 570

B.E. (Automobile Engineering)

AUTOMOTIVE SYSTEMS AND TESTING

(2015 Pattern) (Semester - II)

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

Instructions to the candidates :

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

Q1) a) Write short note on Ackerman steering mechanism. **[4]**

b) What are the different types of Suspension systems? Explain any one. **[6]**

OR

Q2) a) Explain Hydro-elastic suspension. **[4]**

b) Explain : **[6]**

i) Camber

ii) Castor

iii) KPI

Q3) a) What is need of Shock Absorber? **[2]**

b) Write a note on tyre rotation and matching. **[8]**

OR

Q4) a) What is the use of anti roll bar? **[2]**

b) Explain Hydraulic braking system with neat sketch. **[8]**

Q5) a) Write a note on vehicle performance parameters. **[8]**

b) Explain EGR system with neat sketch. **[8]**

P.T.O.

OR

Q6) a) What is catalytic converter? Explain any one. **[8]**

b) Write a note on mechanism of noise generation. **[8]**

Q7) a) What is Passer by noise test? Explain with neat sketch. **[8]**

b) Explain : **[8]**

i) Endurance test.

ii) High speed performance test.

OR

Q8) a) What are the different types of testing tracks? Explain any one in brief. **[8]**

b) Explain : **[8]**

i) Deep water through shallow water.

ii) Corrugated Track.

Q9) a) Differentiate Active safety and Passive safety. **[10]**

b) What are the different types of seats? Explain any one in brief. **[8]**

OR

Q10) a) What are the different types of Crash Testings? Explain any one. **[10]**

b) Write short note on Adaptive cruise control? **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

P69

[Total No. of Pages : 3

[5871]-571
B.E. (Automobile Engineering) (Semester II)
AUTOMOTIVE SYSTEM DESIGN
(2015 Pattern)

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

Instructions to the candidates:

1) ***Answer five questions from the following.***
2) ***Figures to the right indicate full marks.***
3) ***Use electronic pocket calculator is permitted.***
4) ***Assume suitable data if necessary.***

Q1) a) How do you classify clutches? **[4]**

b) Gear ratios for a LMV are as follows:

First gear ratio = 4.2:1

Second gear ratio = 2.56:1

Third gear ratio = 1.52:1

Top gear ratio = 1:1

Inverse of diametral pitch of each gear may be assumed as 3.25mm. The smallest pinion in a gear train must have at least 15 teeth. Speed of engine shaft is 2 times speed of lay shaft. Assuming straight teeth. Calculate center distance between shafts, number of teeth on each gear. **[6]**

OR

Q2) a) An automobile power unit gives a maximum toque of 13.52 Nm. The clutch is a single plate dry disc having effective clutch lining of both sides of plate disc. The coefficient of friction is 0.3 and the maximum axial pressure is 8.29×10^4 pa and external radius of friction surfaces is 1.25 times the internal radius. Calculate the dimensions of clutch plate and total axial pressure that must be exerted by clutch springs. **[6]**

b) What is the purpose of rear axle final drive? **[4]**

P.T.O.

Q3) a) Why a hollow propeller shaft normally used? **[4]**

b) A three speed gear box gives 3 forward speeds and one reverse with a top gear of unity and bottom and reverse gear ratio of approximately 3.3:1. The centre distance between the shafts is to be 110mm approximately. Gear teeth of module 3.25 mm. find the number of gear teeth. **[6]**

OR

Q4) a) Explain the characteristics of a propeller shaft. **[4]**

b) Narrate about clutch frictional materials and their properties. **[6]**

Q5) In a hydraulic braking system the force on foot pedal is 100N, pedal leverage ratio is 4.4, cross sectional area of master cylinder is $4cm^4$. cross sectional area of front piston 20 cm^4. Cross sectional area of the rear piston is $5cm^4$. Distance moved by effort is 1cm. Calculate the following. **[18]**

a) Front to rear brake ratio

b) Total force ratio

c) Distance moved by output

d) Cylinder movement ratio

e) Total movement ratio.

OR

Q6) Explain the following : **[18]**

a) Brake fade.

b) Brake torque.

c) Brake balance.

d) Braking efficiency.

e) Properties of friction lining.

f) Components used in hydraulic brake system.

Q7) a) A semi elliptic type spring has leaves of 75 mm width and 100 mm thickness, effective length is 900 mm. If the stress is not to exceed 220.725 Mpa, 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 Gpa. **[10]**

b) Write a note on air springs. **[6]**

OR

Q8) Discuss on : **[16]**

a) What is nipping in leaf springs?

b) Brake fade and Brake torque.

c) Brake balance and Braking efficiency.

d) Components used in hydraulic brake system

Q9) Design a Tensile Bar for Minimum Cost of the following materials. Assume Factor of Safety of 2.0 **[16]**

Material	Mass density (kg/m^3)	Yield strength (Mpa)	Material cost Rs/N
Steel	3000	16	130
Al alloy	3000	32	50
Magnesium alloy	2100	32	20

Length of the bar is 200 mm and a constant tensile load on bar is of 5000N.

OR

Q10) a) What do you understand by optimum and adequate design? **[6]**

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

i) Design for natural tolerances.

ii) Statistical considerations in design.

Total No. of Questions : 10]

SEAT No. :

P70

[Total No. of Pages : 2

[5871]-572

B.E. (Automobile)

AUTOMOTIVE NVH

(2015 Pattern) (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. Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is Natural frequency and resonance? **[6]**

b) Explain damping. **[4]**

OR

Q2) a) Explain single degree of freedom system. **[6]**

b) What is the generalized coordinates? **[4]**

Q3) a) Explain vibrometer. **[6]**

b) What are vibration absorbers? **[4]**

OR

Q4) a) What is vibration isolation of vehicle engine? **[4]**

b) Explain basic concepts of vibration, time period and frequency. **[6]**

Q5) a) Explain specific acoustic impendance and acoustic intensity. **[8]**

b) Explain with figure octave band analysis. **[8]**

OR

P.T.O.

Q6) a) Explain structure borne sound and air borne sound. **[8]**

b) Explain relationship among sound power, sound intensity and sound pressure level. **[8]**

Q7) a) Explain modal parameter estimation technique **[8]**

b) Explain Pass/Drive by noise. **[8]**

OR

Q8) a) Explain noise from stationary vehicles. **[8]**

b) Explain signal and system analysis. **[8]**

Q9) a) What are methods for control of engine noise and explain them. **[9]**

b) Explain intake and exhaust noise. **[9]**

OR

Q10)a) Write a short on- vibration isolation and vibration damping. **[10]**

b) How the barrier can reduce the noise levels? Explain it. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P71

[Total No. of Pages : 2

[5871]-573

B.E. (Automobile Engg.)

HYBRID ELECTRIC AND FUEL CELL VEHICLE

(2015 Pattern) (Elective-III) (Semester - II)

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

Instructions to the candidates:

1) ***Slove 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 a note on Grid connected hybrid vehicle. **[5]**

b) Explain various application of electric vehicles. **[5]**

OR

Q2) a) What are component of electric vehicle? Give Advantage, Disadvantage & application of Electric Vehicle. **[6]**

b) Explain the working of synchronous motor with neat sketch. **[4]**

Q3) a) Explain working of Mild hybrid. Give suitable example. **[6]**

b) What is engine downsizing? Why it is done in hybrid vehicle. **[4]**

OR

Q4) a) Differentiate between series hybrid and parallel hybrid configuration. **[6]**

b) Explain combined hybrid configuration with neat sketch. **[4]**

Q5) a) Enlist type of Batteries? Explain any one of them with neat sketch. **[8]**

b) Write short note

i) Battery Parameter **[8]**

ii) Characteristics of battery.

OR

P.T.O.

Q6) a) Explain selection of battery in EHV **[8]**

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

Q7) a) With a neat sketch, explain super and ultra-capacitors. **[8]**

b) Enlist type of fuel cell? Explain alkaline fuel cell with neat sketch. **[8]**

OR

Q8) a) With a neat sketch, explain solid oxide fuel cell. **[8]**

b) With a neat sketch, explain PEM fuel cell vehicles. **[8]**

Q9) a) With neat sketch explain working of Hydraulic motors. **[9]**

b) Explain with neat sketch ultra high speed flywheel as an energy storage device. **[9]**

OR

Q10)a) Enlist type of accumulator? Explain hydraulic accumulator with neat sketch. **[10]**

b) Write a short note on Pneumatic Hybrid Power train. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P72

[Total No. of Pages : 2

[5871]-574

B.E. (Automobile)

AUTOMOTIVE HYDRAULICS & PNEUMATICS

(2015 Pattern) (Elective-III) (Semester - II)

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

Instructions to the candidates:

1) ***Slove 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 side indicate full marks.***
4) ***Use of logarithmic table, slide rule, electronic pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain the advantages of fluid power system over other systems. **[6]**

b) Compare hydraulic systems over mechanical systems. **[4]**

OR

Q2) a) Describe in detail different hydraulic fluids used in hydraulic systems. **[6]**

b) Differentiate between static seals and dynamic seals. **[4]**

Q3) a) With neat sketch explain pressure balanced vane pump. **[6]**

b) Differentiate between external and internal gear pumps. **[4]**

OR

Q4) a) Explain different applications of linear actuators with neat sketches. **[6]**

b) With neat sketch explain hoses used in hydraulic systems. **[4]**

Q5) a) Explain with neat sketch meter-in and meter-out circuits. **[8]**

b) Explain construction and working of pressure relief valve with a neat sketch. **[8]**

OR

P.T.O.

Q6) a) Draw unloading circuit and explain its working. **[8]**

b) Draw and explain actuator locking circuit using check valves. **[8]**

Q7) a) Explain construction and working of pneumatic filter and lubricator. **[8]**

b) Explain with circuit direct control of single acting cylinder. **[8]**

OR

Q8) a) Draw symbols of following pneumatic components with application. **[8]**

i) Lubricator

ii) Single acting spring return cylinder

iii) Fixed displacement unidirectional motor

iv) 4/3 DCV

b) Explain with neat sketch vane type air motor. **[8]**

Q9) a) Explain different applications of Accumulator. **[9]**

b) Draw and explain circuit for air suspension system used in automobiles. **[9]**

OR

Q10) a) Explain different types of accumulators with neat sketches. **[9]**

b) Draw and explain air brake system used in automobiles. **[9]**

● ● ●

Total No. of Questions : 10]

SEAT No. :

P73

[Total No. of Pages : 4

[5871] - 575
B.E. (Automobile)
OPERATION RESEARCH
(2015 Pattern) (Semester - II) (Elective-IV) (416498A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of a scientific Calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Define Operations Research. Describe the stage of Operations Research. **[4]**

b) Comparison between trasnportation problem and assignment problem. **[6]**

OR

Q2) a) Explain the North-West corner rule. **[4]**

b) A manufacturing company owns three factories (Sources) and distributes his products to five different retail agencies (destinations). The following table shows the capacities of the three factories, the quantity of products required by the various retail agencies and the cost of shipping one unit of the product from each of the three factories to each of the five retail agencies. Solve by North West Corner Method. **[6]**

	Retail Agency					
Factories	1	2	3	4	5	Capacity
1	1	9	13	36	51	50
2	24	12	16	20	1	100
3	14	33	1	23	26	150
Requirement	100	60	50	50	40	300

P.T.O.

Q3) A company has three factories located in three cities viz. X,Y,Z. These factories supply consignments to four dealers viz.A,B,C and D. The dealers are spread all over the country. The production capacity of these factories is 1000,700 and 900 units per month respectively. The net return per unit product is given in the following table. Determine a suitable allocation to maximize the total return. **[10]**

	Dealers				
Factory	A	B	C	D	Capacity
X	6	6	6	4	1000
Y	4	2	4	5	700
Z	5	6	7	8	900
Requirement	900	800	500	400	2600

OR

Q4) Solve the LP model given below using the Suitable Method **[10]**

Max $z = 3x_1 + 5x_2$

Subjected to : $x_1 + 2x_2 \leq 2000$

$x_1 + x_2 \leq 1500$

$x_2 \leq 600$

$x_1, x_2 \geq 0$

Q5) a) A small project involved 7 activities and their times estimates are listed in the following table. Activities are identified by their begining **[12]**

i) and ending

ii) node numbers.

Activities (i–j)	Estimated Duration (Weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

i) Draw the network diagram of the activities in the projects.

ii) Find expected duration and variance for each activity. What is the expected project length.

iii) Calculate the variance and standard deviation of the project length. What is the probability that the project will be completed:

i) At least 4 weeks earlier than expected time

ii) No more than 4 weeks later than expected time.

Given:

Z(0-Z)	1.33
Probability	0.4082

b) Compare Programme Evaluation and Review Technique and Critical Path Method (PERT and CPM). **[6]**

OR

Q6) a) A project consists of seven activities with the following time estimates. Find the probability that the project will be completed in 30 weeks or less. **[8]**

Activity	Predecessor Activity	Optimistic time estimate (t_o days)	Most likely time estimate (t_m days)	Pessimistic time estimate (t_p days)
A	-	2	5	8
B	A	2	3	4
C	A	6	8	10
D	A	2	4	6
E	B	2	6	10
F	C	6	7	8
G	D,E,F	6	8	10

Z(0-Z)	1.414
Probability	0.4207

b) Five jobs are to be assigned to 5 machines to minimize the total time required to process the jobs on machines. Processing time is given in hours in the table. Select the assignment for minimizing the time of processing. **[10]**

Jobs	Machines					
		A	B	C	D	E
	1	2	4	3	5	4
	2	7	4	6	8	4
	3	2	9	8	10	4
	4	8	6	12	7	4
	5	2	8	5	8	8

Q7) a) Reduce the following game by dominance and find the game value. **[12]**

		PlayerB			
		I	II	III	IV
	I	3	2	4	0
	II	3	4	2	4
PlayerA	III	4	2	4	0
	IV	0	4	0	8

b) Describe birth and death process. **[4]**

OR

Q8) a) Explain what do you mean by the Poisson Process. **[6]**

b) A.T.V. Repairman finds that the time spent on his jobs has an exponential distribution with a 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 the repairman's expected idle? time each day? How many jobs are ahead of the average set just brought in? **[10]**

Q9) a) What is replacement? Describe some important replacement situation. **[6]**

b) A system consists of 10000 electric bulbs. When any bulb fails, it is replaced immediately and the cost of replacing a bulb individually is Re.1/-only. If all the bulbs are replaced at the sametime ,the cost per bulb will be Rs.0.35. The percent surviving i.e. S(t) at the end of month 't' and P(t) the probability of failure during the month 't' are as given below. Find the optimum replacement policy. **[10]**

(t)in month:	0	1	2	3	4	5	6
S(t):	100	97	90	70	30	15	0
P(t)		0.03	0.07	0.20	0.40	0.15	0.15

OR

Q10)a) Explain how the theory of replacement is used in the following problems: **[6]**

i) Replacement of items that fail completely.

ii) Replacement of items whose maintenance cost varies with time.

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? **[10]**

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Total No. of Questions : 10]

SEAT No. : ____

P74

[Total No. of Pages : 2

[5871]-576
B.E. (Automobile Engg.)
TRANSPORT MANAGEMENT & MOTOR INDUSTRY
(2015 Pattern) (Semester-II) (416498 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 side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the terms **[4]**

i) Motor cab

ii) Un-Laden weight

b) Differentiate between duties & responsibilities of STA&RTA **[6]**

OR

Q2) a) What is permit? state purpose of National Permit **[4]**

b) Explain Vehicles exempted from vehicle tax **[6]**

Q3) a) Explain types of vehicle insurance **[4]**

b) Describe Accident survery Report **[6]**

OR

Q4) a) State the Procedure of accident claim in brief **[4]**

b) Explain in detail the issuing of Driving Licence Procedure **[6]**

Q5) a) What is basic element in transport Management? **[8]**

b) Explain Layout of Depot **[8]**

OR

P.T.O.

Q6) a) Explain Passenger scheduling operation and control. **[8]**

b) List document used in transportation? Explain any four documents **[8]**

Q7) a) Explain scheduling of good transport **[8]**

b) Explain storage and transportation of petroleum products **[8]**

OR

Q8) a) Write structure of good transport organization? **[8]**

b) State factors for selection of vehicle for transportation of goods **[8]**

Q9) Write a brief Note on (Any 3) Research organization Auto Industry

a) Role of CIRT in transport Management. **[6]**

b) ARAI **[6]**

c) VRDE **[6]**

d) Petroleum conservation Research Association **[6]**

OR

Q10) Write a brief note on (Any 3)

a) Vehicle Navigation system **[6]**

b) Road Marking **[6]**

c) Smart Cards **[6]**

d) Intelligent transport system **[6]**

Total No. of Questions : 10]

SEAT No. : ____

P75

[Total No. of Pages : 3

[5871]-577

B.E. (Automobile Engineering)

ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

(2015 Pattern) (Semester-II) (416498C) (Elective-IV)

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

Instructions to the candidates:

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

Q1) a) What are the factors which affects the wages? Explain. **[6]**

b) Explain the qualities of good money. **[4]**

OR

Q2) a) Define the terms: Value, Price and Utility. **[6]**

b) What are the characteristics of a good taxation system? **[4]**

Q3) a) What are the different kinds of taxes? **[2]**

b) A melting unit for a steel foundry was purchased for Rs. 40,000 and Rs. 10,000 were spent in its erecting and commissioning. The estimated residual value after 10 years was Rs. 12,000. **[8]**

i) Calculate the annual rate of depreciation.

ii) Calculate the book value of the machine at the end of each year using the straight line depreciation.

iii) Calculate the depreciation fund collected at the end of year 8.

OR

Q4) a) What are different types of Insurances? **[2]**

b) What are the causes of depreciation? Explain. **[8]**

P.T.O.

Q5) a) What are the objectives of cost accounting? **[6]**

b) For manufacturing a turret machine, the expenditure is as given below. Find direct cost, factory cost, total cost of production, cost of sales and selling price.

Material consumed = Rs. 55,000
Indirect factory wages = Rs. 8,000
Direct fees = Rs. 3,000
Advertising Rs. 10,000
Net profit = Rs. 12,500
Depreciation on sales department car = Rs. 1,100
Printing and stationary = Rs. 250
Depreciation on plant = Rs. 4,500
Direct wages = Rs. 65,000
Factory rent = Rs. 6,000
Telephone and postages = Rs. 150
Gas and electricity = Rs. 500
Office salaries = Rs. 2,100
Office rent = Rs. 500
Show room rent = Rs. 1,500
Salesman commission = Rs. 12,650
Sales department car expense = Rs. 1,500 **[10]**

OR

Q6) a) Explain the components of cost. **[6]**

b) A factory producing 150 electric bulbs a day, involves direct material cost of Rs. 250,direct labor cost of Rs. 200 and factory overheads of Rs. 225. Assuming a profit of 10% of the selling price and selling overhead 30% of the factory cost, calculate the selling price of one electric bulb. **[10]**

Q7) a) An investor can make three end year payments of Rs. 15,000 which are expected to generate receipts of Rs. 10,000 at the end of year 4 that will increase annually by Rs. 2,500 for the following 4 years. If the investor can earn a rate of return of 10% on other 8 year investments, is this alternative attractive? **[8]**

b) The cost of the machine is Rs. 6,100 and its scrap value is Rs. 100. The maintenance cost found from experience is as follows. where the machine should be replaced? **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance	100	250	400	600	900	1,200	1,600	2,000

OR

Q8) a) Two devices are available to perform a necessary function for three years. The initial cost for each device at time 0 and subsequent annual savings are shown in the following table. The required interest rate is 8%. Whether the alternatives meet the acceptable rate of return? Which alternative is most preferable? **[8]**

	0	1	2	3
Device A	9,000	4,500	4,500	4,500
Device B	14,500	6,000	6,000	8,000

b) A fleet owner finds from his past experience records that cost of machine is Rs. 6,000 and the running costs are given below, at what stage the replacement is due? **[8]**

Year	1	2	3	4	5	6	7	8
Maintenance Cot (Rs)	1,000	1,200	1,400	1,800	2,300	2,800	3,400	4,000
Scrap Value	3,000	1,500	750	375	200	200	200	200

Q9) a) What are the objectives and functions of estimating? **[8]**

b) Explain the cost estimating procedure. **[10]**

OR

Q10)a) Explain the following. **[8]**

i) Marketable securities

ii) Book debts

iii) Long term liabilities

iv) Intangible fixed assets

b) The company X having certain reserves and surplus has the following details as on 31 Dec. 2000. Prepare a balance sheet.**[10]**

Dividend Payable	Rs. 72,000	Debtors	Rs.1,60,000
Bank balance	Rs. 10,000	Bills payable	Rs. 20,000
Equity shares	Rs. 2,00,000	Plant and equipment	Rs. 80,000
Provision for taxes	Rs. 40,000	Bills receivable	Rs. 20,000
Stock	Rs. 77,000	Creditors	Rs. 55,000
8% preference shares	Rs.1,35,000	General reserve	Rs. 40,000
Land and building	Rs.2,00,000	Cash in hand	Rs. 15,000

Total No. of Questions : 10]

SEAT No. : ____

P76

[Total No. of Pages : 2

[5871]-578
B.E. (Electrical Engineering)
POWER SYSTEM OPERATION & CONTROL
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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 do you mean by stability. Discuss steady state, Transient state and dynamic stability in power system stability study. **[5]**

b) State and explain the methods to improve transient stability. **[5]**

OR

Q2) a) Explain the concept of sub synchronous resonance. **[5]**

b) What is swing equation? Explain swing curve. **[5]**

Q3) a) Enlist the reasons for reactive power control. **[4]**

b) Difference between shunt capacitor and synchronous condenser. **[6]**

OR

Q4) a) Describe the loading capability curve of generator. **[5]**

b) Explain operating principle and working of TCSC with the help of circuit diagram and characteristic. **[5]**

Q5) a) With the help of schematic diagram, explain the operation of speed governing system. **[8]**

b) With block diagram of Load frequency control of single area case, explain frequency response for exact and first order approximated system.**[10]**

OR

P.T.O.

Q6) a) Explain with block diagram Load frequency control of two area case. **[8]**

b) Draw and explain; complete block diagram of automatic voltage regulator. **[10]**

Q7) a) The fuel cost of two units are **[8]**

F1 = 100 + 2P1 + 0.005P12 Rs./hour.

F2 = 200 + 2P2 + 0.01P22 Rs./hour.

Where P_1 and P_2 are in MW. If the plant supplies a load of 450 MW, find the economic load scheduling of two units and incremental fuelcost.

b) Derive the coordinate equation for the economic load dispatch using Lagrange multiplier method. **[8]**

OR

Q8) a) Explain the concept of unit commitment. **[6]**

b) Explain the priority list method of unit commitment. **[10]**

Q9) a) Write a short note on : **[8]**

i) Power pool.

ii) Energy Banking.

b) Explain various types of interchange in power system operation. **[8]**

OR

Q10)a) Describe the following reliability Indices : **[8]**

i) LOLP

ii) LOEE

b) What is reliability of power system? Explain the bath tub curve. **[8]**

Total No. of Questions : 8]

SEAT No. :

P77

[Total No. of Pages : 2

[5871]-579
B.E. (Electrical)
PLC & SCADA APPLICATIONS
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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 selection criteria for PLC system. **[7]**

b) Explain different types of PLC. **[7]**

c) Explain rules for construction of Ladder diagram. **[6]**

OR

Q2) a) Explain retentive timer in details. **[7]**

b) Explain pressure measurement by using pressure sensor. **[7]**

c) Draw a Ladder diagram for bottle filling plant. **[6]**

Q3) a) Explain the PID tuning method. **[8]**

b) How liquid level of the tank is measured by using float type switches, explain in detail. **[8]**

OR

Q4) a) Explain AC motor overload protection. **[8]**

b) Explain speed control of DC motor using PLC. **[8]**

P.T.O.

Q5) a) Draw and explain SCADA architecture in details. **[8]**

b) State advantages & disadvantages of SCADA system. **[8]**

OR

Q6) a) Explain application of SCADA system in Automatic substation control. **[8]**

b) Define SCADA & Explain generation of SCADA. **[8]**

Q7) a) Explain Control Net & Ethernet. **[9]**

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

OR

Q8) a) Explain IEC61850 architecture. **[9]**

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

Total No. of Questions : 8]

SEAT No. :

P78

[Total No. of Pages : 2

[5871]-580
B.E. (Electrical)
CONTROL SYSTEM - II
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) State the sampling theorem and list out the practical approaches to select the sampling period. **[6]**

b) Summarize the procedure for obtaining Pulse-transfer-function. **[6]**

c) Discuss mapping between s-plane and z-plane. **[8]**

OR

Q2) a) What is a zero order hold? Derive its transfer function. **[6]**

b) Solve the following difference equation using Z-transform. **[6]**
$x(k + 2) + 3x(k + 1) + 2x(k) = 0$ with $x(0) = 0$ and $x(1) = 1$

c) Explain the concept of stability analysis of closed loop system using Jury's stability test. **[8]**

Q3) a) Define the terms state, state variable, state vector, state space, state equation, output equation. **[6]**

b) How to obtain the transfer function from the state model? **[6]**

c) With block diagram representation and writing down necessary equations, obtain state model in phase variable form for following transfer function. **[6]**

$$\frac{Y(s)}{U(s)} = \frac{25}{(s+1)(s+4)(s+5)}$$

OR

Q4) a) State advantages of state-space representation over transfer function approach. **[6]**

b) State model of armature control DC motor with armature current and speed as state variables. **[6]**

c) Obtain transfer function from given state model. **[6]**

$$\dot{x} = \begin{bmatrix} -2 & -3 \\ 4 & 2 \end{bmatrix} x + \begin{bmatrix} 3 \\ 5 \end{bmatrix} u \text{ and } y = \begin{bmatrix} 1 & 1 \end{bmatrix} x$$

P.T.O.

Q5) a) Explain any two methods to determine state transition matrix. **[6]**

b) Find eigenvalues, eigenvectors and modal matrix for the system matrix given below. **[10]**

$$A=\begin{bmatrix}0 & 0 & 1\\ 2 & 0 & 0\\ 8 & 2 & -5\end{bmatrix}$$

OR

Q6) a) What do you mean by homogeneous and non-homogeneous system? Obtain the solution of non-homogeneous state equation. **[6]**

b) Obtain state transition matrix (STM) using cayley Hamilton theorem for the system matrix given below **[6]**

$$A=\begin{bmatrix}0 & 1\\ -6 & -5\end{bmatrix}$$

Q7) a) Explain methods of testing controllability of control system by both Gilbert's Test and Kalman's Test. **[6]**

b) Design a full order observer for the following system using direct substitution method if it is desired to place the poles at - 5 and -5. **[10]**

$$x=\begin{bmatrix}-1 & 1\\ 1 & -2\end{bmatrix}x+\begin{bmatrix}1\\ 0\end{bmatrix}u, y=\begin{bmatrix}1 & 0\end{bmatrix}x$$

OR

Q8) a) Draw and explain block diagram of full order-state observer. **[6]**

b) Evaluate the controllability and observability of the system given below by Kalman's Test **[10]**

$$A=\begin{bmatrix}0 & 0 & 0\\ 1 & 0 & -3\\ 0 & -1 & -4\end{bmatrix}, B=\begin{bmatrix}40\\ 10\\ 1\end{bmatrix}, C=\begin{bmatrix}0 & 0 & 1\end{bmatrix}$$

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Total No. of Questions : 10]

SEAT No. :

P79

[Total No. of Pages : 2

[5871]-581
B.E. (Electrical)
FUNDAMENTALS OF MICROCONTROLLER MSP430 AND ITS APPLICATIONS
(2015 Pattern) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write an assembly language program to copy 10 words stored from a location. 0×200 onwards to locations starting from locations 0×250. **[6]**

b) Draw neat diagram the status register of a MSP430 microcontroller **[4]**

OR

Q2) a) Explain different addressing modes used in MSP430 with an example of each. **[6]**

b) Explain the use of following software development tools **[4]**

Assembler

Programmer

Q3) a) Write a short note of different reset mechanism used in MSP430 microcontroller. **[6]**

b) Explain how a capture mode can be used to determine frequency of a waveform using MSP430 microcontroller. **[4]**

OR

Q4) a) Explain the compare mode of MSP430 microcontroller. **[6]**

b) Explain the operation and use of Watch dog timer in MSP430 microcontroller. **[4]**

P.T.O.

Q5) a) Explain the low power modes of MSP430 microcontroller. **[8]**

b) Draw a simplified diagram of ADC 10 and list its important features **[8]**

OR

Q6) a) Explain working of Successive Approximation Register (SAR) ADC. **[8]**

b) Explain the following functions associated with A to D converter. **[8]**

i) Sample and Hold

ii) Filtering

Q7) a) Explain Universal Serial Communication Interface(USCI) in MSP430. **[8]**

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

OR

Q8) a) With a neat diagram explain the SPI interface using MSP430 microcontroller. **[8]**

b) Write a short note on I2C protocol. **[9]**

Q9) a) Write a short note on wireless sensor network. **[8]**

b) Write a short note on ZigBee communication protocol. **[9]**

OR

Q10)a) Write a short note on NFC (Near Field Communication) protocol. **[8]**

b) Explain with a block diagram how an over current relay can be implemented using MSP430 microcontroller. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P80

[Total No. of Pages : 2

[5871]-582
B.E. (Electrical)
POWER QUALITY
(2015 Pattern) (Semester - I) (Elective - I) (403143B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain typical classification of power quality phenomena defined in IEEE 1159. **[5]**

b) What are the mitigation techniques for voltage sags? Explain any one. **[5]**

OR

Q2) a) Explain why power quality problems are becoming very important in today's context. **[5]**

b) Explain the following causes of voltage sag.

i) Voltage sag due to motor starting

ii) Voltage sag due to three phase fault **[5]**

Q3) a) List and explain any two mitigation measures for long duration voltage variations. **[5]**

b) Explain transient introduced by capacitor and load switching. **[5]**

OR

Q4) a) Explain devices used to mitigate flicker. **[5]**

b) Discuss the sources of transient over voltages. **[5]**

P.T.O.

Q5) a) Define harmonics, inter harmonics and sub harmonics. Explain effect of harmonics on all equipment. **[8]**

b) Explain following terms in context to non-sinusoidal supply conditions
   i) True power factor
   ii) Distortion power factor
   iii) Total harmonic distortion **[8]**

OR

Q6) a) Why it is necessary to give special treatment to triplen harmonics? Explain the ways to attenuate those harmonics. **[8]**

b) Explain the following with related to harmonics. **[8]**
   i) K rated transformer
   ii) Capacitor amplifying harmonics

Q7) a) What is a need of IEEE standards in harmonic study? Give their objectives. **[8]**

b) Explain mitigation techniques for harmonics? **[8]**

OR

Q8) a) Explain the function of active filter. How it overcome the drawback of passive filter in controlling harmonics. **[8]**

b) What is a tuned filter? Explain design of tuned harmonic passive filter for mitigation of harmonics. **[8]**

Q9) a) What are factors to be considered while selecting the instrument for monitoring? **[10]**

b) Explain power analyser and disturbance analyser. **[8]**

OR

Q10)a) Explain about flicker meter. **[10]**

b) What are the characteristics of power quality measurement equipment? **[8]**

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Total No. of Questions : 8]

SEAT No. :

P81

[Total No. of Pages : 2

[5871]-583
B.E. (Electrical)
RENEWABLE ENERGY SYSTEMS
(2015 Pattern) (Elective - I) (403143c)

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

Instructions to the candidates:

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

Q1) a) Define : **[5]**

i) LAT

ii) Air mass

b) Explain the factors affecting electrical design of a solar array. **[5]**

c) What are the various components of stand alone PV system? **[5]**

d) Define : **[5]**

i) Tip speed ratio

ii) Pitch control

OR

Q2) a) Define : **[5]**

i) Solar constant

ii) Latitude

b) Give the equivalent circuit of a solar cell. What are the various factors that affect the η of solar cell? **[5]**

c) What are the components of wind electric system. **[5]**

d) Define : **[5]**

i) Cut - in speed

ii) Cut - out speed

P.T.O.

Q3) a) What are the biomass resources? Explain biomass based power generation with a neat block diagram. **[8]**

b) Explain any one gasifier with neat diagram. **[8]**

OR

Q4) a) What are the types of biomass conversion processes? Explain any one in detail. **[8]**

b) Discuss the method of power generation from liquid waste land fill gas. **[8]**

Q5) a) What are the different losses in a electrochemical cell? Explain battery parameters. **[8]**

b) Classify the various methods of energy storage systems. Explain one mechanical storage system. **[8]**

OR

Q6) a) Explain any two energy storage systems (Except mechanical storage system). **[8]**

b) List the methods of hydrogen production. Elaborate any two methods. **[8]**

Q7) a) Define and Explain with example. **[10]**

i) Payback period

ii) Return on Investment

iii) Life Cycle Costing

iv) Time value of Money

v) Net Present value.

b) What are the various parameters required for synchronization of renewable energy source with Grid. **[8]**

OR

Q8) a) Explain with the help of a block diagram grid connected PV system. **[8]**

b) What is Time value of money? Why it should be considered? **[4]**

c) Compare simple payback period with life cycle costing. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P82

[Total No. of Pages : 2

[5871]-584
B.E. (Electrical)
DIGITAL SIGNAL PROCESSING
(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

Q1) a) Differentiate between analog, discrete and digital signal. **[3]**

b) State and explain following two properties of z-Transform. **[7]**

i) Time Shifting

ii) Linear convolution

OR

Q2) a) Draw the block diagram of A to D converter. **[3]**

b) What is DTFT? State and Prove following properties of DTFT. **[7]**

i) Time delay

ii) Scaling

Q3) a) What is inverse z-Transform of following signal with ROC. **[3]**

$X(Z) = 2z^4 + 3z^2 - 5 + 3z^{-1} + 2z^{-3}$

b) State linear and non linear system, causal and non-causal system. **[7]**

OR

Q4) a) Define z-Transform and its ROC. **[3]**

b) State and Explain sampling theorem. **[7]**

Q5) a) Calculate circular convolution and linear convolution of following sequence. **[6]**

$x_1 = \{1, 2, 0, 1\}$ and $x_1 = \{2, 2, 1, 1\}$ using matrix approach

b) Prove the relation between Z-Transform, DTFT and DFT. **[10]**

OR

P.T.O.

Q6) a) Compute DFT of the sequence whose values for one period is given by.
$x_1 = \{1, 1, 0, 0\}$ **[8]**

b) Explain DIT FFT algorithm for computation of DFT. **[8]**

Q7) a) What are ideal selective filters? Explian each with equations and graphics. **[8]**

b) Write difference equation in Z transform and draw direct from-I realization for the system described by difference equation. **[8]**

$$y(n) = 0.5y\,(n-1) - 0.25\,y(n-2) + x(n) + 0.4x\,(n-1)$$

OR

Q8) a) How bilinear transformation method can be used to convert analog filter into digital filters? **[8]**

b) An analog filter has a transfer function H (s) = $\frac{2}{(s+1)(s+2)}$. With T = 1 sec, find H(z) using bilinear transformation. **[8]**

Q9) a) Design and ideal low pass filter with frequency response. **[10]**

$H_d\,(e^{j\omega}) = 1$ for $-\frac{\pi}{4} \le |\omega| \le \frac{\pi}{4}$

$H_d\,(e^{j\omega}) = 0$ for all other values of ω

Find the values of h(n) for N = 7. Use rectangular window.

b) Explain direct form realization of FIR filters. **[8]**

OR

Q10)Write short note on application of DSP for **[18]**

a) DSP for induction motor speed control.

b) Measurement of frequency.

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Total No. of Questions : 10]

SEAT No. :

P83

[Total No. of Pages : 2

[5871]-585
B.E. (Electrical)
RESTRUCTURING AND DEREGULATION
(2015 Pattern) (Semester - I) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
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 the term Return in equity in detail. **[5]**

b) Explain the main functions of Central Electricity Authority. **[5]**

OR

Q2) a) Explain in brief Critical issues and challenges before the Indian power sector. **[5]**

b) Explain method of Rate of return regulation. **[5]**

Q3) a) Explain in brief capital cost, marginal cost. **[5]**

b) Describe the desirable characteristics of tariff of electricity. **[5]**

OR

Q4) a) Explain in detail performance based regulation. **[5]**

b) Write short note on Socio economic aspects in regulation. **[5]**

Q5) a) Write a short note on Renewable energy Credits and carbon credits. **[8]**

b) Write short note on wholesale competition, retail competition based on industry structure and contractual arrangements. **[8]**

OR

P.T.O.

Q6) a) Compare between bilateral discharge and multilateral trades. **[8]**

b) What are models based on energy trading? **[8]**

Q7) a) Specify peculiarities of electricity as a commodity. Explain rules that govern the electricity market. **[8]**

b) Explain the working of Day Ahead Market. **[8]**

OR

Q8) a) Explain in brief the various electricity markets. **[8]**

b) Explain MCP and market efficiency. **[8]**

Q9) a) Explain the following concepts as applied to transmission of electricity.

i) Physical transmission rights

ii) Open access **[10]**

b) Write short note on Cost allocation of Transmission system. **[8]**

OR

Q10)a) Explain Congestion in power network, reasons for congestion and congestion management methods in detail. **[12]**

b) Write the functions of National Load dispatch center. **[6]**

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Total No. of Questions : 8]

SEAT No. :

P84

[Total No. of Pages : 2

[5871]-586
B.E. (Electrical)
ELECTROMAGNETIC FIELDS
(2015 Pattern) (Semester - I) (Elective - II) (403144 (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 whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and mention it clearly.***
5) ***Use of logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.***

Q1) a) Derive an expression for electric field intensity E due to infinite sheet of charge with charge density ρ_1 C/m using Gauss's law. **[8]**

b) An electric dipole of $100\,\hat{a}_z$ pC.m is located at origin. Find V and E at points. **[8]**

i) (0, 0, 10)

ii) ($1\pi/3$, $\pi/2$)

c) What is operator Del. Explain the operation gradient and divergence. **[4]**

OR

Q2) a) Derive an expression for energy density in electrostatic field. **[8]**

b) What is Gauss's law? Derive an expression for electric field due to an infinite long straight conductor using Gauss's law. **[8]**

c) If $\bar{A} = x^2 y\hat{a}_x + x\hat{a}_y + 2yz\hat{a}_z$ Find $\nabla . \bar{A}$ at point (–3, 4, 2). **[4]**

Q3) a) Find magnetic field on the axis of circular current loop of radius 'a'. Specialize the result for the magnetic field at the center of the loop. **[8]**

b) State and explain Biot-Savart law. Also obtain Biot-Savart law equation in terms of distributed current sources. **[8]**

OR

P.T.O.

Q4) a) A circular loop located on $x^2 + y^2 = 9$, z = 0 carries a direct current of 10A along $\widehat{a_\phi}$. Determine $\overline{H}$ at (i) (0, 0, 4) and (ii) (0, 0, –4). **[8]**

b) Explain scalar magnetic potential and vector magnetic potential. **[8]**

Q5) a) Explain polarization in dielectrics. Derive mathematical expression for polarization. **[8]**

b) A homogeneous dielectric ($\varepsilon_r = 2.5$) fills region 1 ($x \leq 0$) while region 2 ($x \geq 0$) is free space. If $D_1 = 12\hat{a}_x - 10\hat{a}_y + 4\,\hat{a}_z$ nC/m^2. Find D_2 and θ_2 **[8]**

OR

Q6) a) Define relaxation time. Derive an expression for relaxation time. **[8]**

b) 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]**

Q7) a) State Faraday's law. Derive an expression for transformer emf. **[8]**

b) Define displacement current. Derive the modified point form of Ampere's law $\nabla \times \overline{H} = J_c + \frac{\partial \overline{D}}{\partial t}$. **[10]**

OR

Q8) a) What is Poynting vector? State and prove Poynting theorem. What is the significance of the terms involved? **[8]**

b) State the Maxwell's equations in point form for static field and steady magnetic field with their physical significance. Explain how these are modified for time varying fields. **[10]**

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Total No. of Questions : 8]

SEAT No. :

P85

[Total No. of Pages : 2

[5871]-587
B.E. (Electrical)
EHV AC TRANSMISSION
(2015 Pattern) (Semester - I) (Elective - II) (403144C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different types of vibrations of transmission conductors in brief. **[8]**

b) Explain surface voltage gradient on single conductor. **[8]**

c) Explain the significance of bundled conductor in EHVAC transmission system.

OR

Q2) a) Derive the condition for maximum charge on ehv conductor of three phase line in terms of elements of matrix [M] where [M] = [P] –1 and [P] is Maxwell's potential coefficient matrix. **[8]**

b) Prove that a one 750 KV line power handling capacity of a.c. transmission line carry as much power as four 400 KV circuits for equal distance of transmission. **[8]**

c) A 345–kV line has an ACSR Bluebird conductor 0.04477 m in diameter with an equivalent radius for inductance calculations of 0.0179 m. The line height is 12 m. Calculate the inductance per km length of conductor and the error caused by neglecting the internal flux linkage. **[4]**

Q3) a) Derive the expression for voltages induced in the conductors of un energized circuit of double circuit three phase line. **[8]**

b) Explain the effect of high electrostatic field on humans, animals, and plants. **[8]**

OR

P.T.O.

Q4) a) Explain the terms primary shock current, secondary shock current and let-go current. **[8]**

b) Write note on ungrounded ground wire. **[8]**

Q5) 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 corona formation and methods to reduce the corona effects. **[10]**

OR

Q6) a) Define terms : **[8]**

i) Corona inception voltage

ii) Visual corona voltage

b) Write a note on 'Measurement of Audible Noise'. **[10]**

Q7) a) State and Explain at least four factors to be considered in the design of EHV lines based upon the steady state limits. Also state their limiting value. **[6]**

b) Define tan δ loss factor and derive an expression for insulation resistance of a cable. **[8]**

OR

Q8) a) Write note on various properties of XLPE used in EHV cables. **[8]**

b) Name the materials used for insulation in E.H.V cables; and state the properties of SF_6 gas as an insulating in cables. **[8]**

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Total No. of Questions : 8]

SEAT No. :

P86

[Total No. of Pages : 2

[5871]-588

B.E. (Electrical)

ELECTRIC AND HYBRID VEHICLES

(2015 Pattern) (Elective - II) (403144-D) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Which are the various parameters that determines the performance of the vehicle. **[6]**

b) Which are the different cell balancing methods? Explain any one with diagram. **[8]**

c) Write a short note on Ultra capacitor. **[6]**

OR

Q2) a) What is Battery Management System ? Explain functions of BMS. **[6]**

b) What is SoC? Explain any method for estimation of SoC. **[6]**

c) Explain with the neat diagram working & components of Fuelcell vehicle. **[8]**

Q3) a) Explain in detail Tractive Effort of electric vehicle. **[8]**

b) Explain series & parallel hybrid drive train. **[8]**

OR

Q4) a) Which are the different challenges of designing EV. **[8]**

b) Explain acceleration characteristics of various motors for Electric Vehicle. **[8]**

P.T.O.

Q5) a) Explain working BLDC motor with diagram **[8]**

b) Draw & explain Switch Reluctance Motor. **[8]**

OR

Q6) a) Explain GPS tracking of Electric Vehicle. **[6]**

b) Draw & explain Electric steering system. **[6]**

c) Explain auto parking system of EV. **[4]**

Q7) a) Which are the various PHEV control strategies? Explain anyone in detail. **[6]**

b) Describe role of EV aggregator for dispatching a fleet of EV. **[8]**

c) Explain demand response for EV. **[4]**

OR

Q8) a) Explain Vehicle to Grid infrastructure. **[8]**

b) Explain Vehicle to Home with neat diagram. **[6]**

c) Explain in detail Vehicle to Vehicle. **[4]**

Total No. of Questions : 11]

SEAT No. :

P87

[Total No. of Pages : 2

[5871]-589

B.E. (Electrical)

SPECIAL PURPOSE MACHINES

(2015 Pattern) (Semester - I) (Elective - II) (403144E)

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, Q11 is compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) Explain in detail MMF of distributed winding. **[7]**

OR

Q2) How torque is determined from ∞ energy? **[7]**

Q3) Explain Trapezoidal PMSM with suitable diagram. **[7]**

OR

Q4) State various applications of PMSM. **[7]**

Q5) State significance of transformations in modelling of PMSM. **[6]**

OR

Q6) Explain αβ-dq transformations with usual notations. **[6]**

P.T.O.

Q7) a) With suitable diagram explain construction and working of switch reluctance motor. State its two applications. **[8]**

b) Derive expression for dynamic torque in case of reluctance machine by usual notations. **[8]**

OR

Q8) a) State any four differences between axial and radial air gap reluctance motor. **[8]**

b) State applications of reluctance motor. **[8]**

Q9) a) Explain concepts of lead angle in case of stepper motor. **[9]**

b) With suitable diagram explain construction and working of variable reluctance motor. **[9]**

OR

Q10)a) State applications of stepper motor. **[9]**

b) Explain different static and dynamic characteristics of stepper motor. **[9]**

Q11)Attempt any two : **[16]**

a) Explain types of linear induction motors in brief.

b) Give performance specifications of linear induction motor.

c) State various applications of linear induction motor.

Total No. of Questions : 8]

SEAT No. :

P88

[Total No. of Pages : 3

[5871]-590
B.E. (Electrical)
SWITCHGEAR & PROTECTION
(2015 Pattern) (Semester - II)

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

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable data, if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

Q1) a) Explain the need of protective system. What are different causes of faults? Explain effects of faults in power system. **[6]**

b) A 3ph, 11 kv, 50 Hz alternator with earthed neutral has reactance of 5Ω/ph. It is connected to a busbar through a circuit breaker. The distributed capacitance upto circuit breaker is 0.01 μF. **[6]**

Determine :

i) Peak restriking voltage across CB contacts.

ii) Frequency of oscillations

iii) Average rate of rise of restriking voltage upto 1st peak

c) With diagram explain construction & working of vacuum circuit breaker. Why VCB is not preferred for voltages beyond 33 KV. **[8]**

OR

Q2) a) A 3 phase, VCB is rated as 1500 Amp, 1000 MVA 33 KV, 3 seconds determine. **[6]**

i) Rated normal current

ii) Breaking capacity

iii) Symmetrical breaking current

iv) Rated making capacity

v) Short time rating

vi) Rated service voltage

P.T.O.

b) Explain following terms w.r.t. circuit breaker switching. **[6]**

i) Restriking voltage

ii) Recovery voltage

iii) RRRY

c) Explain with diagram construction & working of nondirectional induction disc type relay. **[8]**

Q3) a) Draw neat block diagram of static relay & explain its working. **[8]**

b) What do you mean by single phasing in case of 3 phase induction motor. With neat diagram, explain working of single phase preventer. **[8]**

OR

Q4) a) With neat block diagram, explain working of numerical relay. **[8]**

b) What is PMU? Draw and explain its block diagram. **[8]**

Q5) a) Explain construction and working of Buchholz relay with neat diagram. State its advantages and disadvantages. **[10]**

b) The neutral point of 10 kv generator is earthed through a resistance of 10Ω. The relay is set to operate when there is balance current of 1 Amp. The CT ratio is 1000/5. What percentage of generator winding is protected against phase to ground fault by percentage differential protection.

What will be the value of resistance to be connected in neutral to ground circuit to give 90% protection against phase to ground fault. **[8]**

OR

Q6) a) Explain protection of alternator against. **[12]**

i) Interturn faults

ii) Loss of prime mover

iii) Loss of excitation

b) A 3 phase 400v/33 kv Y-Δ connected power transformer is protected by differential system. The CT'S on LT side have ratio of 1000/5 what must be CT ratio on HT side? Draw the scheme. **[6]**

Q7) a) Explain the concept of distance relaying applied to protection of transmission lines. Compare impedance relay, reactance relay and mho relay with reference to their applications and characteristics. **[8]**

b) Draw block diagram, and explain components of power line carrier communication (PLCC). **[8]**

OR

Q8) a) Explain with neat diagram three stepped distance protection used in case of transmission lines. **[8]**

b) Explain with neat diagram. **[8]**

i) Protection of parallel feeders

ii) Time graded system protection of three phase feeder.

Total No. of Questions : 9] **SEAT No. :**

P89 **[Total No. of Pages : 3**

[5871]-591
B.E. (Electrical)
POWER ELECTRONICS CONTROLLED DRIVES
(2015 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.***
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) Explain multi quadrant operation of a motor driving a hoist load. **[5]**

b) A drive has following parameters: J = 1 kg - m2, T = 15 - 0.01 N, N-m and passive load torque, T_L = 0.005 N, N-m, where N is the speed in rpm. Initially the drive is operating in steady - state. Now it is to be reversed. For this, motor characteristic is altered such that T = –15-0.01 N. N-m for positive as well as negative values of N. Calculate the reversal Time.**[5]**

OR

Q2) a) Explain regenerative braking of DC motor along with speed torque characteristics. **[5]**

b) A200V, 875rpm, 100A separately excited dc motor has an armatureresistance of 0.06Ω. It is fed from asingle phase full converter with an ac source voltage of 220V, 50Hz. Assuming continuous conduction, calculate firing angle for rated motor torque and 750 rpm.**[5]**

Q3) a) Write the merits and demerits of VSI and CSI fed lnduction motor Drives. **[5]**

P.T.O.

b) A 3-phase, 400V, 50Hz, 6 pole, 925 rpm star connected induction motor has the following parameters: Rs = 0.2Ω, R'r = 0.3Ω, Xs = 0.5Ω, X'r = 1Ω. The motor is fed from a VSI with a constant V/f ratio. The motor is to be braked by plugging from its initial full load speed of 925 rpm. The stator to rotor turns ratio is 2. Calculate the initial braking torque. **[5]**

OR

Q4) a) Explain the operation of a Chopper controlled Separately excited DC motor drive with suitable waveforms. Draw speed torque characteristics. **[5]**

b) A 220V, 1000 rpm dc series motor takes an armature current of 100A when driving a load with constant torque. Armature and Field resistance are 0.05Ω each. Now it is operated under dynamic braking at twice the rated torque and 800 rpm. Calculate the value of braking current and resistor. Assume linear magnetic circuit. **[5]**

Q5) a) Explain the principle of Vector control of three phase Induction motors with a neat diagram. **[10]**

b) Explain the Servo mechanism in servo drives with a neat diagram. **[6]**

OR

Q6) a) Write a short ntoe on selection criteria of motor. Why a motor of smaller rating can be selected for a short time duty? **[10]**

b) A constant speed drive has the following duty cycle: **[6]**

i) Load rising linearly from 200 to 500 KW : 4 min

ii) Uniform load of 400KW: 2 min

iii) Regenerative power returned to the supply

reducing linearly from 400KW to 0:3 min

iv) Remains idle: 4 min

Determine the power rating of the motor assuming loss to be proportional to $(\text{power})^2$

Q7) a) Draw and explain the block diagram of a self controlled synchronous motor fed from a three phase VSI. **[10]**

b) What is a self control mode of synchronous motor? **[6]**

OR

Q8) a) What are the similarities between a brushless dc motor and a conventional dc Motor? **[6]**

b) Explain the operation of three phase brushless dc motor drive along with related waveforms. **[10]**

Q9) Write a short notes on any three of the following. **[18]**

a) Traction drives **[6]**

b) Textile mills **[6]**

c) Crane and hoist drives **[6]**

d) Sugar mills **[6]**

Total No. of Questions : 8]

SEAT No. :

P90

[Total No. of Pages : 2

[5871]-592

B.E. (Electrical)

HIGH VOLTAGE ENGINEERING

End Semester Paper [403149]

(2015 Pattern) (Semester - II) (Elective-III)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***You are advised to attempt not more than 6 questions.***
4) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam.***
5) ***Assume suitable data, if necessary.***

Q1) a) State & explain Paschen's law with example. **[8]**

b) Draw a neat diagram of 3 stage cascade transformer and explain its working. Also state its advantages and disadvantages. **[8]**

c) Which types of impurities are present in liquid dielectric materials? Explain how liquids are classified based on that? **[4]**

OR

Q2) a) Explain suspended particle theory in liquid dielectric materials. **[8]**

b) With a neat diagram explain working of Tesla coil. State its advantages and applications. **[8]**

c) What is time lag? Why it occurs? what are the different factors which affect on it?. **[4]**

Q3) a) Explain the generating voltmeter used for measuring high dc voltages. **[8]**

b) Explain how a sphere gap can be used to measure the peak value of voltages. what are factors that influence such voltage measurement? **[8]**

OR

P.T.O.

Q4) a) Describe Electro-optical signal converter for EHV system. **[8]**

b) With a neat diagram explain capacitive voltage transformer. How it can be used for voltage measurement in power system? **[8]**

Q5) a) Explain Reynolds & Mason's Theory. **[8]**

b) State & Explain with diagram causes of power frequency over voltages & switching surges. **[8]**

OR

Q6) a) Describe in detail lightening phenomenon. **[8]**

b) Write a short note on insulation co-ordination. **[8]**

Q7) a) Discuss following tests carried out on porcelain insulator: **[9]**

i) 50% Dry impulse flashover test

ii) Impulse with stand test

b) Write a short note on Design, layout and grounding of HV laboratory. **[9]**

OR

Q8) a) Describe earthing and shielding of high voltage laboratories. **[9]**

b) Describe for bushing

i) Wet power frequency voltage with stand test

ii) Momentary power frequency voltage with stand test

iii) Visible discharge test. **[9]**

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Total No. of Questions : 11]

SEAT No. :

P91

[Total No. of Pages : 2

[5871]-593

B.E. (Electrical)

HVDC AND FACTS

(2015 Pattern) (Elective - III) (Semester - II)

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

Instructions to the candidates:

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

Q1) Explain inverter operation in HVDC systems with extinction angle and overlap angle. Derive equations. **[7]**

OR

Q2) What are the technical limitations of HVDC systems. **[7]**

Q3) With suitable diagrams discuss the 12 pulse converter operation in HVDC system. **[7]**

OR

Q4) Discuss the harmonic generation in HVDC systems and state control methods for the same. **[7]**

Q5) Explain the principle of operation, control and power transfer characteristics of VSC. **[6]**

OR

Q6) Write a note on HVDC plus system. **[6]**

P.T.O.

Q7) Solve any two **[16]**

a) Explain AC controller based structures.

b) Discuss the static power converter structures.

c) Describe the construction of back to back converters and its operation.

Q8) a) Draw a practical structure of TCSC and explain principle of operation and different operating modes of TCSC. **[10]**

b) Explain TCR plus TSC operation and along with its V-I characteristics. **[8]**

OR

Q9) a) With neat sketches explain construction and operation of SSSC. **[10]**

b) Discuss the applications of SVC. **[8]**

Q10)a) By using relevant diagrams explain different operating modes of UPFC controllers. **[8]**

b) With detailed diagram explain operation of UPFC. **[8]**

OR

Q11)a) Discuss the operation of series controller of UPFC. Explain control of the same. **[8]**

b) Are there any operational constraints on the operation of UPFC? **[8]**

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Total No. of Questions : 5]

SEAT No. :

P2299

[Total No. of Pages : 2

[5871]-594
B.E. (Electrical)
DIGITAL CONTROL SYSTEM
(2015 Pattern) (Elective - III) (403149(C)) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Questions 1, 2, 5 are compulsory. Solve any one question from 3 and 4.***
2) ***Your answers will be valued as a whole.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Attempt any three : **[21]**

a) Explain the concept of quantization and frequency aliasing in details.

b) Draw typical block diagram of sampled data control system and explain different blocks in details.

c) Explain conversion of pulse transfer function to state space model using first companion form (Direct form 1).

d) Explain tests for controllability and observability for discrete data control system.

Q2) a) Explain the tests for determining controllability and observability of discrete data control system. **[5]**

b) A discrete data control system is defined as

$x(K + 1) = Ax(K) + Bu(K)$

$C(K) = Dx(K)$

where

$$A = \begin{bmatrix} 0 & 1 \\ -1 & -2 \end{bmatrix} \quad B = \begin{bmatrix} 1 \\ -1 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 0 \end{bmatrix}$$

Determine controllability and observability of the system.

[10]

P.T.O.

Q3) a) Explain the concept of bilinear transformation and process of obtaining digital controller from analog controller using bilinear transformation. **[7]**

b) Obtain digital controller for the following analog controller with the sample period. T = 0.01 sec. **[11]**

$$G(s)=\frac{100}{s+100}$$

OR

Q4) Explain the following methods for discretizing analog controllers. **[18]**

a) Euler's backward method

b) Euler's forward method

c) Trapezoidal method

Q5) Explain the following digital control system applications (any two) : **[16]**

a) Digital temperature control

b) Stepper motor control

c) Digital position control

Total No. of Questions : 12]

SEAT No. :

P93

[Total No. of Pages : 2

[5871]-595

B.E. (Electrical Engineering)

Intelligent Systems and Applications in Electrical Engineering

(2015 Pattern) (Elective - III) (Semester - II) (403149(D))

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, Q. No. 11 or Q. No. 12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

UNIT - I

Q1) A Explain biological neuron model with neat sketch. **[6]**

OR

Q2) Explain types of neuron activation functions. **[6]**

UNIT - II

Q3) Explain multilayer feed forward neural networks. **[6]**

OR

Q4) Explain learning rules. **[6]**

UNIT - III

Q5) Explain ART-I network with neat sketch. **[8]**

OR

Q6) Explain Self organizing maps. **[8]**

P.T.O.

UNIT - IV

Q7) a) Explain various membership functions used in fuzzy logic. **[8]**

b) Discuss various fuzzy operators. **[8]**

OR

Q8) a) Explain properties of fuzzy set. **[8]**

b) Explain crisp logic Vs fuzzy logic. **[8]**

UNIT - V

Q9) a) Explain predicate logic used in fuzzy systems. **[8]**

b) Explain sugeno inference system. **[9]**

OR

Q10) a) Explain various de-fuzzification methods. **[8]**

b) Explain Mamdani inference system. **[9]**

UNIT - VI

Q11) a) Explain software architecture used in expert system. **[8]**

b) Write note on introduction to genetic algorithm and explain mutation in genetic algorithm. **[9]**

OR

Q12) a) Explain following terms used in genetic algorithm. **[8]**

i) Population

ii) Chromosomes

iii) Fitness function

iv) Genetic Operators

b) Explain rule based system in expert system. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P94

[Total No. of Pages : 2

[5871]-596

B.E. (Electrical)

Analog Electronics and Sensing Technology

(2015 Pattern) (Open Elective - III) (Semester - II) (403149(E))

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q. 1 or Q. 2, Q. 3 or Q. 4, Q. 5 or Q.6, Q.7 or Q.8.***
2) ***Use of non programmable calculator is allowed.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain open loop and close loop configuration of TL082. **[8]**

b) Explain with block diagram LM741. **[4]**

c) Design a phase shift oscillator so that f_0 = 200Hz. Assume C = 0.1 μF calculate R_f, R_1 values of resistors. **[8]**

OR

Q2) a) Explain V to f converter using LM3311. **[6]**

b) Explain Op-Amp application as differentiator. **[6]**

c) Design a phase shift oscillator so that f_0 = 965Hz. Assume C=0.05 μF. Calculate R, R_1 and R_f. **[8]**

Q3) a) Explain temperature sensor LM35 in detail with its calibration range and real time application. **[8]**

b) Explain INA240 current sense amplifier with its diagram calibration and range. **[8]**

OR

Q4) a) Explain HDC1080 humidity sensor in detail. **[8]**

b) Explain DRV 5053 Hall Effect based current sensor. Principle of operation range and calibration. **[8]**

P.T.O.

Q5) a) Explain DRV 5032 Hall Effect Sensor in detail. **[8]**

b) What is Inductive Position sensor, Capacitive position sensor. Explain their working with circuit diagram. **[8]**

OR

Q6) a) Explain LVDT with its circuit and working. **[8]**

b) Explain AFE5805 Ultrasonic sensor in detail. **[8]**

Q7) a) What is sensing AFEs for capturing a broad range of wavelengths. What are different sensors used. **[9]**

b) Explain concept of infrared. Explain Near Infrared spectroscopy. **[9]**

OR

Q8) a) What is OPT3007 Light Sensor Explain in details. **[9]**

b) What is need of isolation. How it is achieved. Explain optical isolator. **[9]**

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Total No. of Questions : 8]

SEAT No. :

P95

[Total No. of Pages : 2

[5871]-597
B.E. (Electrical Engineering)
SMART GRID
(2015 Pattern) (Semester - II) (Elective - IV) (403150A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define Smart Grid and give its functions. **[6]**

b) Explain PMU and importance in smart grid. **[6]**

c) Write a short note on real time prizing? **[8]**

OR

Q2) a) State and explain challenges of smart grid. **[6]**

b) Explain the function of IED & their application. **[6]**

c) Highlight on role of geographic information system in smart grid and also give its function. **[6]**

Q3) a) Describe concept and formation of micro grid. **[8]**

b) Explain issues of Micro grid when connected. **[8]**

OR

Q4) a) Explain about protection and control of micro grid. **[8]**

b) Explain the concept of Micro grid, its need and applications. **[8]**

Q5) a) Highlight the issues related to power quality in Smart Grid. **[8]**

b) Write a short note on Web based power quality Monitoring. **[8]**

OR

P.T.O.

Q6) a) Explain the concept of power quality and EMC in Smart Grid. **[8]**

b) Explain power quality audit and its importance in smart grid. **[8]**

Q7) a) Why cyber security is of prime importance in smart grid? How it can be achieved. **[9]**

b) Write a short note on Wi-Max based communication in smart grid. **[9]**

OR

Q8) a) Explain cloud computing and its need. **[9]**

b) Write a note on Broadband Over a power line. **[9]**

Total No. of Questions : 5]

SEAT No. :

P96

[Total No. of Pages : 2

[5871]-598
B.E. (Electrical)
ROBOTICS & AUTOMATION
(2015 Pattern) (Semester - II) (Elective - IV) (403150B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Write short note on **[10]**

i) Homogeneous co-ordinate.

ii) Rational transformation.

b) Distinguish between the following **[10]**

i) Servo controlled and non servo controlled manipulators.

ii) Resolution and Accuracy repeatability as Robot specification.

OR

Q2) a) Write short note on SCARA & PUMA Robot.

b) Explain Yaw pitch and Roll in Robot application.

[20]

Q3) a) Explain with neat Sketch about Homogeneous co-ordinators and D-H representation.

b) Write on inverse solution by direct approach.

[16]

P.T.O.

Q4) a) Write inverse solution by Geometric approach.

b) Describe in detail control of Robot arm for closed loop control in position servo.

[16]

Q5) a) Write on Robot application for part sorting and Inspection application for any type of Robot. **[9]**

b) Explain Hydraulic, Pneumatics and Electric drive technology in Robot with illustration. **[9]**

Total No. of Questions : 10]

SEAT No. :

P97

[Total No. of Pages : 2

[5871]-599
B.E. (Electrical)
ILLUMINATION ENGINEERING
(2015 Pattern) (Semester - II) (Elective - IV) (403150C)

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) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain optical system of human eye with suitable diagram. **[5]**

b) With suitable diagram explain any one type of photometer. **[5]**

OR

Q2) a) Explain different lamp materials. **[5]**

b) With suitable diagram explain construction and working of sodium vapour lamp. state its 2 disadvantages. **[5]**

Q3) a) Explain the term - Effective reflectance. **[5]**

b) Explain zonal cavity method of find average horizontal Illumination. **[5]**

OR

Q4) a) Give expected characteristics of good luminarie. **[5]**

b) Give five points of comparison for following lamps **[5]**

i) Incandescent lamp

ii) Halogen lamp

iii) LED

Q5) a) State advantages of good illumination scheme. **[8]**

b) A light source of 1000 watt with MSCP = 2500 is suspended 3 meters above working plane. Determine

i) Illumination below the lamp

ii) Lamp efficiency

iii) Illumination 3 meter away on the horizontal plane from vertical point below the lamp. **[8]**

OR

P.T.O.

Q6) a) State & explain Lambert's cosine law. **[8]**

b) Explain illumination scheme for health care centres & hospitals. **[8]**

Q7) a) Explain the design factors considered for indoor sports lighting. **[8]**

b) State types of projectors with respective beam spread with suitable diagram explain different locations of projectors. **[8]**

OR

Q8) a) With suitable diagrams explain different arrangements in different types of roads. **[8]**

b) Explain following terms with respect to road lighting - visual performance, visual comfort, Glare, Uniformity ratio. **[8]**

Q9) a) Explain any 5 types of intelligent LED fixtures. **[10]**

b) With suitable diagram explain working of solar tube. **[8]**

OR

Q10)a) Explain working of Laser arrangement with suitable diagram. State types of LASERs. **[10]**

b) Explain construction & working of Fiber optic cables. State its 2 types. **[8]**

Total No. of Questions : 8]

SEAT No. :

P98

[Total No. of Pages : 2

[5871]-600
B.E. (Electrical)
VLSI DESIGN
(2015 Pattern) (Semester - II) (Elective - IV) (Open Elective) (403150D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the complete EDA tool VLSI design flow with a neat diagram. **[8]**

b) List and explain synthesizable statements in VHDL. **[6]**

c) Explain the following data objects in VHDL. **[6]**

i) Constant

ii) Signal

iii) Variable

OR

Q2) a) Explain functions in VHDL. Write VHDL code for D flip flop using function for rising edge clock. **[8]**

b) Differentiate between Moore FSM and Mealy FSM. **[6]**

c) Write a short note on packages in VHDL. **[6]**

Q3) a) What are the limitations of CPLD. State the advantages of FPGA over CPLD. **[8]**

b) Explain the following terms with reference to FPGA **[8]**

i) LUT

ii) Interconnect

iii) I/O block

iv) SRAM

OR

P.T.O.

Q4) a) Explain the need of PLDs. Compare ASIC with general purpose processor and DSP Processor. **[8]**

b) Explain with diagram a generic architecture of FPGA. **[8]**

Q5) a) List the power dissipations in CMOS logic. Explain anyone power dissipation in detail. **[8]**

b) Design the CMOS logic gate for $F = \overline{(AB + CD)}$. **[8]**

OR

Q6) a) Explain CMOS inverter and its transfer characteristics in detail. **[8]**

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

i) Body effect

ii) Hot electron effect

iii) Velocity saturation

Q7) a) Write the steps to realize a VLSI design of seven segment display and keyboard. **[10]**

b) Explain with diagram the design serial data receiver. Write the VHDL code to realize a 7 - bit data receiver. **[8]**

OR

Q8) a) Draw a top level diagram for comparator with three outputs of comparator: one corresponding to a > b, another to a == b and finally a < b. To realize a signed and unsigned comparator using VHDL code, write the name of package to be used in library declarations. Write the VHDL entity for signed and unsigned comparator. **[10]**

b) Explain the VLSI design implementation using VHDL code to realize a Barrel Shifter. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P99

[Total No. of Pages : 2

[5871]-601
B.E. (E & TC)
VLSI DESIGN & TECHNOLOGY
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q. No.1 or Q. No.2, Q. No.3 or Q. No.4, Q. No.5 or Q. No.6, Q. No.7 or Q. No.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable date if necessary.***

Q1) a) Explain in detail sequential and concurrent statements. **[6]**

b) Write short note on clock distribution technique. **[7]**

c) Draw CPLD XC9500 series architecture and explain in detail. **[7]**

OR

Q2) a) Draw HDL design flow and explain in brief. **[6]**

b) Write short note on supply & Ground bounce. **[7]**

c) Draw & explain the architecture of FPGA XC4000 series. **[7]**

Q3) a) Explain the following : **[8]**

i) Velocity saturation

ii) Mobility degradation

b) Explain power delay product (PDP) & body effect. **[8]**

OR

Q4) a) Design 4:1 Multiplexer using transmission gate and compare it with conventional method. **[8]**

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

i) Device sizing

ii) Rise and fall time

P.T.O.

Q5) a) Write note on ASIC design flow : **[8]**

b) What is DRC? Explain in detail design rules in CMOS VLSI design. **[10]**

OR

Q6) a) Write short note on layout vs schematic and explain LVS checking process. **[8]**

b) Draw stick diagram for CMOS Inverter, AND, OR Gate. **[10]**

Q7) a) Explore the need of design for testability with appropriate examples. **[8]**

b) What is the need of boundary scan check? Explain boundary scan architectures. **[8]**

OR

Q8) a) What is Test Access port? Draw & explain the state diagram of TAP controller. **[8]**

b) With reference of BIST, explain the following : **[8]**

i) BILBO

ii) LFSR

Total No. of Questions : 10]

SEAT No. :

P100

[Total No. of Pages : 2

[5871]-602
B.E. (E & T.C.)
COMPUTER NETWORK AND SECURITY
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain the TCP/IP Protocol suite. **[6]**

b) Compare Packet switching vs. Circuit Switching. **[4]**

OR

Q2) a) A slotted ALOHA network transmits 200 bit frames using a shared channel with a 200kbps Bandwidth. Find the throughput if the system produces

i) 1000 frames per second **[6]**

ii) 500 frames per second

iii) 250 frames per second

b) Compare IPv4 vs. Ipv6 **[4]**

Q3) a) What is routing? Explain link state routing protocol. **[6]**

b) List and explain different types of addresses used in IPv4. **[4]**

OR

Q4) a) Draw and explain the format of IPv6 datagram. **[6]**

b) Explain the concept of unicast and multicast routing protocol. **[4]**

P.T.O.

Q5) a) Explain the connection establishment using three way handshaking in TCP Protocol. **[8]**

b) Compare connection oriented Vs connectionless services of transport layer. **[5]**

c) Explain the process to process delivery. **[5]**

OR

Q6) a) Draw and explain the TCP header and explain the function of each header. **[8]**

b) Compare UDP vs. TCP. **[5]**

c) Explain the different features of SCTP. **[5]**

Q7) a) Explain the Telnet and FTP with suitable diagram. **[8]**

b) Explain the Architecture of World wide web (WWW). **[8]**

OR

Q8) a) Explain the various functions of Network management system. **[8]**

b) Write a short note on electronic mail **[8]**

Q9) a) What is symmetric key cryptography? Explain Data encryption standards. **[8]**

b) Explain RSA Algorithm. **[8]**

OR

Q10)a) Explain confidentiality with Symmetric key cryptography and Asymmetric key cryptography. **[8]**

b) Explain the various security features offered by Pretty Good Privacy (PGP) **[8]**

Total No. of Questions : 8]

SEAT No. :

P101

[Total No. of Pages : 3

[5871]-603
B.E. (E & TC)
Radiation and Microwave Techniques
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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) Two lossless X-band (8.2-12.4 GHz) horn antennas are separated by a distance of 100λ. The reflection coefficients at the terminals of the transmitting and receiving antennas are 0.1 and 0.2, respectively. The maximum directivities of the transmitting and receiving antennas (over isotropic) are 16 dB and 20 dB, respectively. Assuming that the input power in the lossless transmission line connected to the transmitting antenna is 2W, and the antennas are aligned for maximum radiation between them and are polarization-matched, find the power delivered to the load of the receiver. **[6]**

b) Compare the various radiating dipole elements in terms of antenna parameters. **[6]**

c) Explain the structural details, types and applications of strip line. **[8]**

OR

Q2) a) Explain the following terms related to antenna: **[6]**

i) Radiation Pattern

ii) Radiation Efficiency

iii) Antenna impedance

b) Explain the construction and principle of operation of Yagi-Uda Antenna. **[6]**

c) With neat diagram explain the working of a rectangular cavity resonator. Obtain the expression for resonant frequency of oscillation. Calculate the lowest resonant frequency of a rectangular cavity resonator of dimensions a = 2 cm, b = 1 cm and d = 3cm. **[8]**

P.T.O.

Q3) a) Explain the S-matrix of Magic Tee. Explain with neat diagram the application of Magic Tee for unknown impedance measurement. **[8]**

b) Explain the working principle, construction and applications of Isolator. An isolator has an insertion loss of 0.35dB and an isolation of 50dB. Determine the scattering matrix of the isolator if the isolated ports are perfectly matched to the junction. **[8]**

OR

Q4) a) Explain and compare the properties of E-plane and H-plane Tee with neat diagram. Also derive scattering matrix of E plane Tee. **[8]**

b) Explain with neat diagram the construction and principle of operation of a two hole directional coupler. **[8]**

Define:

i) Coupling coefficient

ii) Directivity

iii) Isolation

Q5) a) Explain the high frequency limitations of conventional tubes. Classify Microwave Tubes. **[8]**

b) Explain the construction, working principle and application of the following: **[8]**

i) Microwave Tunnel Diode

ii) Varactor Diode

OR

Q6) a) Explain the concept of Velocity Modulation. Explain the principle of working of a Reflex Klystron with an Applegate diagram. **[8]**

b) Explain the construction, working principle and application of the following: **[8]**

i) PIN diode as a modulator

ii) Schottky Barrier Diode

Q7) a) Explain Microwave terrestrial and satellite communication systems. Differentiate between these two. **[6]**

b) How VSWR of a device under test is measured using a slotted line and VSWR meter. **[6]**

c) Calculate the SWR of a transmission system operating at 10 GHz. Assume TE_{10} wave transmission inside a rectangular waveguide of dimensions a = 4 cm, b = 2.5 cm. The distance measured between twice minimum power points is 1 mm on a slotted line. **[6]**

OR

Q8) a) How to measure the phase shift introduced by a microwave network. Explain with suitable set-up and example. **[6]**

b) Explain with neat diagram the mechanism of microwave heating in microwave ovens. **[6]**

c) Explain in detail the various types of Microwave Radiation Hazards. How the radiation protection can be practiced? **[6]**

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Total No. of Questions : 8]

SEAT No. :

P102

[Total No. of Pages : 3

[5871]-604
B.E. (E&TC)
DIGITAL IMAGE AND VIDEO PROCESSING
(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right side indicate full marks.***
3) ***Use of logarithmic tables slide rule, mollier charts, electronic pocket calculator and steam table is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) With the help of diagram explain the structure of Human Eye. Explain image formation in Human Visual system in detail? **[6]**

b) Filter following image using 3×3 Neighbor overaging by assuming. **[8]**

i) Zero padding ii) Pixel replication

$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 4 & 2 & 5 & 1 \\ 1 & 2 & 6 & 3 \\ 2 & 6 & 4 & 7 \end{bmatrix}$$

c) Explain arithmatic coding with suitable example? **[6]**

OR

Q2) a) Explain the concept of image digitization with neat diagram? What is the overall effect of increasing the bit depth of an image? **[6]**

b) Explain smoothing and sharpening of an image in frequency domain? **[8]**

c) Generate Huffman Code of the following image matrix? Calculate the efficiency of Huffman Code? **[6]**

$$\begin{bmatrix} 25 & 25 & 25 & 15 \\ 15 & 25 & 25 & 25 \\ 25 & 15 & 15 & 15 \\ 15 & 05 & 05 & 00 \end{bmatrix}$$

P.T.O.

Q3) a) Explain following Morphological operations with applications on binary image. **[8]**

i) Dilation & Erosion

ii) Opening & Closing

b) Consider the same 8×8 image that we worked with in region growing. Let the predicate be threshold ≤ 3. Also draw the quad tree. **[9]**

5	6	6	6	7	7	6	6
6	7	6	7	5	5	4	7
6	6	4	4	3	2	5	6
5	4	5	4	2	3	4	6
0	3	2	3	3	2	4	7
0	0	0	0	2	2	5	6
1	1	0	1	0	3	4	4
1	0	1	0	2	3	5	4

OR

Q4) a) A pseudo binary imgae X and the structuring elements B are given as below : **[8]**

$$X = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

Perform, $Y_1 = X \ominus B$, and $Y_2 + X \oplus B$

b) Explain in detail following thresholding operations. **[9]**

i) Global thresholding

ii) Adaptive thresholding

What will be the result of applying thresholding on gray scale image.

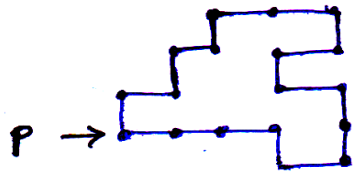
Q5) a) What is boundary representation? Explain chain codes for boundary representation? Also write algorithm for finding chain codes in 4-direction and 8 - direction.

Give & obtain the object shape represented by 8- directional chain code 466001225642. Obtain the circular chain code for the same. **[9]**

b) What is moments? Explain different statistical moments used for shape representation? **[8]**

OR

Q6) a) Give the eight directional chain code for arbitrary shape as shown in figure. **[9]**



Explain how polygonal approximation is used for shape representation?

b) Define 'texture' with reference to image processing? Explain description using texture and statastical moments? **[8]**

Q7) a) With the help of block diagram explain MPEG video coding standard? **[8]**

b) Explain block-based motion estimation and compensation technique? State advantages and disadvantages of this technique? **[8]**

OR

Q8) a) Using suitable illustration explain the difference between digital image and digital video.? Explain the following types of video signals. **[8]**

i) Component video

ii) Composite video

iii) S video.

b) Why digital videos are converted into YCb Cr format? Hence explain 4 : 4 : 4, 4 : 2 : 2 and 4 : 2 : 0, Y CbCr sampling formats? **[8]**

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Total No. of Questions : 8]

SEAT No. :

P964

[Total No. of Pages : 2

[5871] - 605

B.E. (E & TC)

INDUSTRIAL DRIVES & CONTROL

(2015 Pattern) (Semester - I) (Elective - I) (404184 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) ***Assume suitable data if necessary.***

Q1) a) Explain the 1 quadrant, 2 quadrant and 4 quadrant operation of an electrical drive system in brief with the help of suitable block diagram. **[6]**

b) Draw and explain the operation of single-phase Full-converter feeding a separately excited dc motor. Explain with typical waveforms, the operation in continuous current mode. **[8]**

c) Explain the operation of 3 phase induction motor for following methods : **[6]**

i) Operation below the rated frequency

ii) Operation above the rated frequency

OR

Q2) a) Explain the operation Open loop and Closed loop control of an electrical drive system. Enlist the advantages of closed loop drive system. **[6]**

b) With neat circuit diagram explain operation of four quadrant chopper fed drive for a separately excited dc motor. **[8]**

c) Briefly explain the operation three phase induction motor drive. **[6]**

Q3) Write Short note : **[18]**

a) Servo motor drive

b) Cylindrical rotor motor drive

c) Stepper motor drive

P.T.O.

OR

Q4) a) Draw and briefly explain the torque speed characteristics of synchronous reluctance motor at constant voltage and frequency. **[8]**

b) With the help of a neat circuit diagram and waveforms explain the operation of three phase brushless dc motor drive. State the applications of three phase brushless dc motor drive. **[10]**

Q5) a) With the help of suitable block schematic, explain the applications of solar power system in water pumping. **[8]**

b) Explain working of a typical solar power system. Explain the need and selection criteria of Solar panel, Battery, charge controller and inverter in PV system. **[8]**

OR

Q6) a) With the help of neat block diagram explain Stand alone and grid connected and Hybrid Solar power System. **[8]**

b) Compare fixed speed and variable speed wind power system. Explain the advantages of variable speed control of turbine. **[8]**

Q7) a) Explain the role Artificial Intelligence in electrical machines and drive applications. **[8]**

b) What is Neuro fuzzy system? Explain Adaptive network based Fuzzy Interface System. **[8]**

OR

Q8) a) How can we apply Fuzzy logic system in power electronics? Explain any typical application in detail. **[8]**

b) Explain the operation of neural network-based control system. Explain general design methodology of neural network-based system. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P103

[Total No. of Pages : 2

[5871]-606
B.E. (E&TC)
EMBEDDED SYSTEM & RTOS
(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

Q1) a) Explain the following design metrics of an embedded system'? Time-to-prototype, Time-to-market, Maintainability. **[5]**

b) Explain Waterfall model? State the merits and demerits **[5]**

OR

Q2) a) What are different categories of embedded system? List & define main characteristics of embedded system. **[5]**

b) Explain different type of RTOS? How it is differs from GPOS **[5]**

Q3) a) Draw and explain μcos-II Kernel structure **[5]**

b) Explain real time scheduling algorithm. **[5]**

OR

Q***4)*** a) Explain following functions : **[5]**

i) OSMboxPend ()

ii) OSMboxPost ()

b) What is Priority Inversion explain with an example? **[5]**

OR

P.T.O.

Q5) a) Explain and four features of Cortex Architecture with advantages. **[8]**

b) Draw and interfacing diagram of Seven Segment display with LPC 1768. Write a program or algorithm for same. **[8]**

OR

Q6) a) Explain how interrupt structure of Cortex is different from ARM7 **[8]**

b) Explain various power saving modes of LPC 1 768 **[8]**

OR

Q7) a) Explain the Linux Kernel construction in detail. **[9]**

b) What is need of a device driver? Explain any 3 types of device driver in detail. **[9]**

OR

Q8) a) How to build a Linux kernel image explain in detail. **[9]**

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

i) Redboot

ii) LIBC

iii) Busybox

Q9) a) What is Arduino Uno ATmega328? Explain standard libraries in Arduino. **[8]**

b) Draw an interfacing diagram of 4 LEDs with Arduino board. And write a program to blink them alternately. **[8]**

OR

Q10)a) With the help of case study explain application development with Arduino board. **[8]**

b) Explain and 4 functions with respect to Arduino programming. **[8]**

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

P104 **[Total No. of Pages : 2**

[5871]-607
B.E. (E&TC)
INTERNET OF THINGS
(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) What are enabling technologies in IoT? Describe any two. **[7]**

b) How sensors and actuators work? Explain with practical example. **[6]**

c) What is MODBUS? Explain MODBUS message framing and transmission modes. **[7]**

OR

Q2) a) Compare IoT and M2M services. **[6]**

b) Explain the RFID middleware architecture. **[7]**

c) Justify how Z-wave protocol is suitable for design of home automation application. **[7]**

Q3) a) What is 6LowPAN? Write a brief overview of 6LowPAN adaptation Layer. **[8]**

b) What is RPL? Explain how it is useful in IoT implementations. **[8]**

OR

Q4) a) Write note on any two. **[8]**

i) AMQP ii) COAP iii) MQTT

b) What is REST protocol? Explain characteristics of REST based API. **[8]**

P.T.O.

Q5) a) What are various types of Big Data? Explain in detail. **[10]**

b) What is precision? Explain different types of errors. **[8]**

OR

Q6) a) There are two types of data analytics techniques namely qualitative and quantitative. Explain what these techniques are and compare them. **[8]**

b) A Cloud-based IoT platform is a dynamic and flexible resource sharing platform delivering IoT services. Elaborate on the three service models used in Cloud- based IoT platform. **[10]**

Q7) a) Explain Smart home and smart city applications in view of IoT. **[8]**

b) How IoT will be used to protect environmental loss? **[8]**

OR

Q8) a) How IoT will be used to protect environmental loss? **[8]**

b) Explain how you will design a smart water management system for agriculture using IoT. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

P105

[Total No. of Pages : 2

[5871]-608
B.E. (E & TC)
WAVELETS
(Semester - I) (2015 Pattern) (Elective - II) (412185A)

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) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data if necessary.***

Q1) a) If $x(t) = 2t \; 0 \le t \le 2$

$-t + 4 \; 2 \le t \le 4$

Project the signal $x(t)$ on V_0 and W_0 Subspaces. Prove that $V_1 = V_0 \oplus W_0$ **[16]**

b) Define banach space with example. What is the importance of vector spaces in signal processing. **[4]**

OR

Q2) a) Derive the coefficients of daub - 2 filter bank structure. **[12]**

b) If $x_1(t) = 1 \qquad 0 \le t \le 1$

Find time bandwidth product for signal $x_1(t)$. **[8]**

Q3) a) Derive Alias cancellation conditions for Harr 2 band filter bank structure. Also Derive perfect reconstruction conditions for the same. **[12]**

b) Explain concept of vanishing moments with suitable example. **[6]**

OR

P.T.O.

Q4) $x(n) = \{4, 3, 2, 1\} \in V_1$ show decomposition of signal $x(n)$ using wavelet lifting scheme. Also show reconstruction of the same. **[18]**

Q5) a) Compare JPEG and JPEG 2000. Also give the similarities of the same. **[10]**

b) Explain transform coding. **[6]**

OR

Q6) a) State and explain various axioms of MRA. **[8]**

b) Explain with block diagram MPEG coding for audio. **[8]**

Q7) *y* $x(n) = \{10, 20, 8, 6, 4, 30, 8, 2\} \in V_1$ perform the denoising of signal $x(n)$ and reconstruct the same by throwing away the coefficients associated with W subspace. **[16]**

OR

Q8) Write short notes on : **[16]**

i) Wavelet watermarking

ii) Discrete wavelet multitone modulation

Total No. of Questions : 8]

SEAT No. :

P106

[Total No. of Pages : 2

[5871]-609

B.E. (E & TC)

ELECTRONIC PRODUCT DESIGN

(2015 Pattern) (Semester - I) (Elective - II) (412185 B)

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

Instructions to the candidates:

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

Q1) a) Discuss noise as a coupling mechanism and how to minimise these at circuit board. **[8]**

b) What is the significance of functional model? Explain with example. **[8]**

c) In finding software faults in real time embedded system explain the features and limitations of debugger, simulator and emulators. **[4]**

OR

Q2) a) What is the need of sheilding? Explain with suitable example. **[6]**

b) What is the importance of design specification in product design? **[8]**

c) Explain different stages in software development at which bugs may enter and list common bugs and ways to eliminate them. **[6]**

Q3) a) Differentiate clearly functional versus architectural models and specifications versus requirements. **[10]**

b) Elaborate the terms coupling and cohesion with respect to partitioning. **[8]**

OR

Q4) a) Explain in detail. **[8]**

i) Black boxes test

ii) White box test

iii) Grey box test

b) What is defect/bug? What is defect life cycle? **[10]**

P.T.O.

Q5) a) Explain EMI and EMC issues in detail. **[8]**

b) Differentiate between active and passive components. **[8]**

OR

Q6) a) Explain waterfall model of software development with suitable example. **[8]**

b) State in detail the features of good programming. **[8]**

Q7) a) What is meant by Bill of Material (BOM)? Explain with suitable example why organisations need BOM? **[8]**

b) Explain the need of Documentation. **[8]**

OR

Q8) a) Discuss in detail visual techniques with example. **[8]**

b) Write short notes on (any two) : **[8]**

i) Layout of Documentation

ii) Preservation of Documentation

iii) Records

Total No. of Questions : 8]

SEAT No. : ____

P107

[Total No. of Pages : 2

[5871]-610

B.E. (Electronics & Telecommunication)

OPTIMIZATION TECHNIQUES

(Semester - I) (2015 Pattern) (Elective - II) (412185C)

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) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) Maximize $Z = 5x_1 + 8x_2$

Subject to $3x_1 + 2x_2 \geq 3$

$x_1 + 4x_2 \geq 4$

$x_1 + x_2 \leq 5$

$x_1 \geq 0, x_2 \geq 0$

a) Solve using artificial variable method. **[14]**

b) Solve using graphical method. **[6]**

OR

Q2) a) Solve one iteration using Revised simplex method. **[14]**

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

Subject to $3x_1 - x_2 + 3x_3 \leq 7$

$-2x_1 + 4x_2 \leq 12$

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

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

b) Solve using Lagrange's multiplier method. **[6]**

Maximize $Z = x_1^2 + 3x_2^2 + 5x_3^2$

Subject to $x_1 + x_2 + 3x_3 = 2$

$5x_1 + 2x_2 + x_3 = 5$

$x_1, x_2, x_3 \geq 0$

P.T.O.

Q3) Minimize $f(x) = 0.65 - \frac{0.75}{(1+x^2)} - 0.65x \tan^{-1}\left(\frac{1}{x}\right)$.

a) Solve using interval halving method in the interval (0, 3) to achieve an accuracy of within 5% of the exact value. **[12]**

b) Solve using dichotomous search method in the interval (0, 3) to achieve an accuracy of within 5% of the exact value. **[6]**

OR

Q4) Find maximum of $f(\lambda) = \frac{0.5}{\sqrt{1+\lambda^2}} - \sqrt{1+\lambda^2}\left(1 - \frac{0.5}{1+\lambda^2}\right) + \lambda$.

a) Using unrestricted search with an accelerated step size using an initial step length of 0.1 and a starting point of 0.0. **[9]**

b) Using exhaustive search method in the interval (0, 3) to achieve an accuracy of within 5% of the exact value. **[9]**

Q5) Minimize $f(x_1, x_2) = 5x_1^2 + 2x_2^2 - 2x_1 x_2 - 4x_1 - 4x_2 + 4$

a) Using univariate method. Take starting point (0.1, 0.1). Show calculations for two iterations. **[12]**

b) Using classical optimization technique. **[4]**

OR

Q6) Minimize $f(\lambda) = \lambda^4 - 4\lambda^3 - 6\lambda^2 - 16\lambda + 4$ using quadratic interpolation method. Determine error. **[16]**

Q7) a) Implement following boolean equation $Y = A\bar{B} + \bar{A}B$ using neural network model. **[8]**

b) Explain fuzzy union, intersection and complement rule with example. **[8]**

OR

Q8) Write notes on (any two) : **[16]**

a) Ant colony optimization

b) GA based optimization technique

c) Simulated annealing technique

Total No. of Questions : 10]

SEAT No. : [ ]

P108

[Total No. of Pages : 2

[5871]-611

B.E. (Electronics and Telecommunication)

ARTIFICIAL INTELLIGENCE

(2015 Pattern) (Semester - I) (Elective - II) (412185-D)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

Q1) a) Discuss the simple reflex agent and model based agent. **[5]**

b) Discuss the min-max approach for game decision. **[5]**

OR

Q2) a) Discuss the unification and lifting concepts with one or two examples. **[5]**

b) Discuss the MARS rover agent and its PEAS aspects. **[5]**

Q3) a) Explain the Iterative Deepening Approach with suitable example. **[5]**

b) Explain the steps involved in the knowledge Engineering process. Give an example. **[5]**

OR

Q4) a) Explain first order logic(FOL) syntax & semantics with one example each. **[5]**

b) Discuss the Hidden Markov model and its use. **[5]**

Q5) a) Discuss the inductive and deductive learning with examples. **[8]**

b) What is ensemble learning? Sketch the block schematic and explain how it's effective as compared with individual algorithms. **[8]**

OR

P.T.O.

Q6) a) What are the different learning methods? Explain any one in detail. **[8]**

b) Discuss Explanation Based Learning (EBL) and Relevance Based Learning (RBL) with suitable examples. **[8]**

Q7) a) Discuss the Pattern Recognition System. Explain the Face Recognition application on the basis of pattern recognition. **[8]**

b) Write a short note : Principal component analysis. Discuss with reference to Eigen value and Eigen vectors and their importance. **[8]**

OR

Q8) a) Discuss the Linear Discriminant Analysis. **[8]**

b) Take an example of Template Matching theory and Prototype Matching Theory and compare them for pattern recognition. **[8]**

Q9) a) What is Discourse understanding? What is Grammar Induction? Explain with examples. **[9]**

b) Discuss the ambiguity and disambiguity. Give examples to explain the concepts. How do we do disambiguation? **[9]**

OR

Q10)a) What is parsing? Develop the parsing tree with suitable labels for the sentence: "A beautiful bird sat on the delicate branch". **[9]**

b) Enlist and discuss the three different ambiguities in Natural Language Processing. **[9]**

Total No. of Questions : 8]

SEAT No. : ____

P109

[Total No. of Pages : 2

[5871]-612

B.E. (Electronics & Telecommunication)

ELECTRONICS IN AGRICULTURE

(2015 Pattern) (Semester - I) (Elective - II) (412185E)

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

Instructions to the candidates:

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

Q1) a) Draw the block diagram of SCADA & explain function of each block in brief. **[8]**

b) Draw and explain architecture model of profi-bus. PA. **[6]**

c) Draw & explain gas analysis on the basis of gas density. **[6]**

OR

Q2) a) Draw the architecture of virtual instrument and explain in brief, also mention advantages of virtual instrumentation. **[8]**

b) What is open system network? Explain in brief. Also write advantages and limitations of such system. **[6]**

c) What is the need of leaf area measurement. Explain in detail with suitable diagram. **[6]**

Q3) a) What is the need of Precision Farming? Explain various conditions and limitations of P.F. **[8]**

b) Explain yield monitoring/mapping w.r.t. Precision Farming. **[8]**

OR

Q4) a) How GIS/GPS can be used for yield monitoring in Precision Farming. **[8]**

b) What is necessity of soil sampling in precision farming? What precautions should be followed. **[8]**

P.T.O.

Q5) a) Explain how irrigation system works in agriculture field? Explain open loop & closed loop irrigation systems. **[10]**

b) Why site specific spraying is required? Explain It's necessity in brief. Also explain crop handling processing. **[8]**

OR

Q6) a) Which are different soil meteorological parameters? Explain various soil-moisture measurement techniques in brief. **[10]**

b) Explain in detail with block diagram : Green house environment control system. **[8]**

Q7) a) How the drying process is used for preservation? Compare the process of natural drying and artificial drying. **[8]**

b) Explain the role of Electronics Governance in agricultural sector in detail. **[8]**

OR

Q8) a) Describe various Governance products and services in agriculture sector. **[8]**

b) Explain electronic control system for grape drying process. **[8]**

Total No. of Questions : 10]

SEAT No. :

P110

[Total No. of Pages : 2

[5871]-613
B.E. E&TC
MOBILE COMMUNICATION
(2015 Pattern) (Semester - II) (404189)

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

Q1) a) Explain different types of grading? **[6]**

b) If a group of 20 trunks carries 10 Erlang of traffic and average call duration is 3 minute calculate average no. of calls in progress. Also calculate total number of calls originating per hour. **[4]**

OR

Q2) a) If a group of 7 trunks is offered 4 Erlang of traffic find - **[4]**

i) Grade of service

ii) The probability that only one trunk is busy

iii) The probability that only one trunk is free

iv) The probability that at least one trunk is free

b) Draw and Explain input controlled time division space switching. **[6]**

Q3) a) Explain pure chance traffic, statistical equilibrium, full available. **[6]**

b) A cellular telephone system's total channel capacity consist of 10 clusters with 5 cells in each. Cluster and 20 channels in each cell. Calculate number of occupied channels. **[4]**

OR

P.T.O.

Q4) a) Design two stage switching network for 36 incoming and 64 outgoing trunks using switch size 3×4? Calculate number of cross points required. **[5]**

b) Draw & Explain co-channel interference and adjucent channel interference. **[5]**

Q5) a) Draw GSM system Architecture & Explain function of each. **[8]**

b) Write a various radio transmission parameters used in GSM system. **[8]**

OR

Q6) a) Draw and Explain different Interfaces used in GSM system. **[8]**

b) Explain five functional entities associated with MSC in GSM 900. **[8]**

Q7) a) Draw & Explain GPRS Architecture. **[8]**

b) Classify logical channel in GSM system. **[9]**

OR

Q8) a) Draw & Explain GSM Burst structure. **[8]**

b) Draw & Explain mobile to Mobile call Process? **[9]**

Q9) a) Discuss disruptive technologies of 5G Mobile communication. **[9]**

b) Draw & Explain Architecture of LTE. **[8]**

OR

Q10)a) Compare GSM with CDMA related with following parameters. **[9]**

i) Carrier spacing ii) Modulation method

iii) Data Rate iv) Uplink frequency

iv) Downlink freq.

b) Draw & Explain open wireless 5G architecture. **[5]**

c) Compare 5G architectural layers with standard OSI reference model. **[3]**

❄ ❄ ❄

Total No. of Questions : 8]

SEAT No. :

P111

[Total No. of Pages : 3

[5871]-614

B.E. (E & TC)

BROADBAND COMMUNICATION SYSTEMS

(2015 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Figures to the right indicate full marks.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data if necessary.***

Q1) a) With a neat block diagram, explain the features of the key elements of an optical fiber transmission link & what are the advantages of fiber optics communication. **[8]**

b) With reference to mode theory for optical propagation explain the terms. Phase velocity, group velocity, group delay, Mode field diameter. **[6]**

c) Explain bending loss in Fiber optics communication system? **[6]**

OR

Q2) a) Explain Erbium Doped Fiber Amplifier (EDFA) Architecture & amplifier mechanism. **[6]**

b) What are the key system requirements that are needed in analyzing a point-to-point explain the point-to-point link design with reference to choice of components? **[8]**

c) A typical relative refractive index difference for an optical designed for long distance transmission in 1%. Estimate the numerical aperture for the fiber when the core index is 1.46. Find the critical angle at the core cladding interface within the fiber. **[6]**

P.T.O.

Q3) a) Explain how satellite stays stable in orbit? Mention condition at which centripetal force = centrifugal force. **[10]**

b) Write a short note on look angle determination? **[6]**

OR

Q4) a) Explain briefly the following terms w.r.t satellite communication.

i) Prograde orbit

ii) Argument of perigee

iii) Ascending node & line of nodes

iv) Apogee

v) Perigee

vi) Solar day

vii) Sidereal day

viii) Azimuth angle **[8]**

b) Explain the AOCS subsystem of a satellite.With a neat diagram. **[8]**

Q5) a) Explain in detail how TTC & M is useful to determine satellite Health? **[8]**

b) Explain the orbital effects in communication system performance (draw diagrams & Write equations to support your answer). **[9]**

OR

Q6) a) Draw & Explain satellite Antenna subsystem? **[8]**

b) Explain satellite power subsystem w.r.t.

a) Eclipse

b) Solar battery life **[9]**

Q7) a) With Reference to a satellite system. Derive the expression for satellite link budget? **[8]**

b) A C-band earth station has an antenna with a transmit gain of 54dB. The transmitter outputs a distance of 37,000km by an antenna with gain of 26 dB. the signal is then routed to a transponder with a noise temperature of 500 k, a Bandwidth of 36 MHz & gain of 110 dB.

i) Calculate path loss at 6.1 GHz. wavelength is 0.04918m.

ii) Calculate the power at the o/p port of the satellite antenna in dBW.

iii) Calculate the noise power at the transponder i/p, in dBW, in a BW of 36 MHz.

iv) Calculate the C/N ratio, in dB in the transponder.

v) Calculate the carrier power in dBW & in watts, at the transponder output. **[9]**

OR

Q8) a) Write a short note on ku band rain effect. **[8]**

b) Derive & Explain importance of G/T ratio & System noise Temperature? **[9]**

Total No. of Questions : 8]

SEAT No. :

P112

[Total No. of Pages : 5

[5871]-615
B.E. (E&TC)
MACHINE LEARNING
(2015 Pattern) (Semester - II) (404191A) (Elective - III)

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

Instructions to the candidates:

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

Q1) a) What is Machine learning? What is the need of it? Explain four examples of machine learning in detail? **[6]**

b) Compare Supervised and Unsupervised machine learning. **[6]**

c) Use Iterative Dichotomiser 3 algorithm to formulate decision tree for the dataset shared below. The target variable is to take decision whether to play foot ball or not. **[8]**

Outlook	Temperature	Humidity	Wind	Played football (yes/no)
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

OR

P.T.O.

Q2) a) What is Machine Learning? Describe Unsupervised Learning. Name two algorithms of it. **[6]**

b) What is Likelihood? Describe the concept of Maximum Likelihood Estimation (MLE) for linear regression. **[6]**

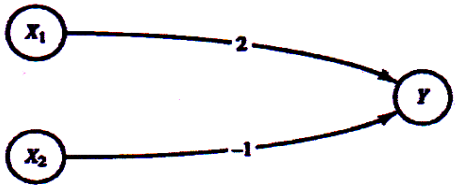
c) The following table shows the results of a recently conducted study on the correlation of the number of hours spent driving with the risk of developing acute back-ache. Find the equation of the best fit line for this data. **[8]**

No. of hours spent driving (x)	10	9	2	15	10	16	11	16
Risk Score on a scale of 0-100	95	80	10	50	45	98	38	93

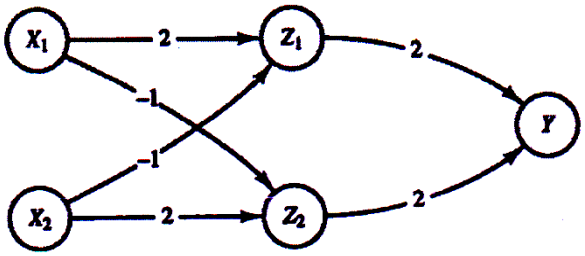
Q3) a) Fill in the blanks/Answer the following. (2 M each) **[8]**

i) Equation for Sigmoidal basis function is _____

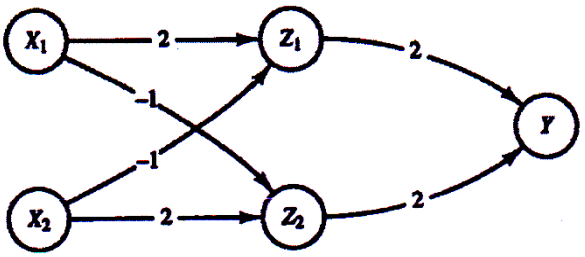
ii) Following figure implement which logic?



iii) Following figure implement which logic?



iv) Logical Expression for z_1 is _____

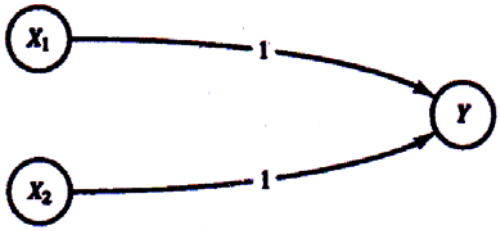


b) In Machine learning, what is need of dimensionality reduction? Describe factor analysis along with its application. **[8]**

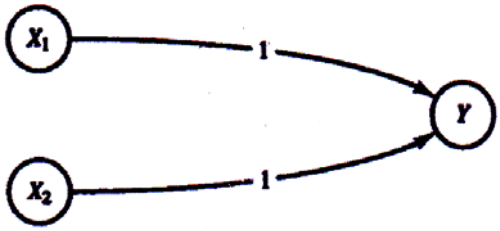
OR

Q4) a) Fill in the blanks/Answer the following (2 M each) **[8]**

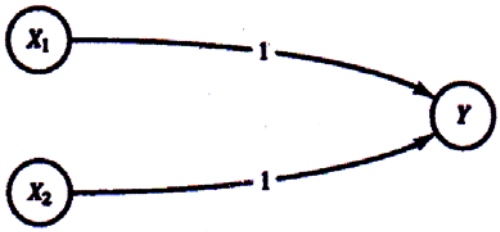
i) Following MP neuron model need to be used as AND Logic. The Threshold value should be _____



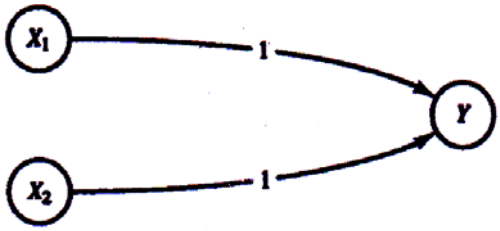
ii) Following MP neuron model need to be used as OR Logic. The Threshold value should be. _____



iii) Following MP neuron model has $x_1 = 1$ and $x_2 = 1$. The Threshold value is 2. What will be value of Y _____



iv) Following MP neuron model has $x_1 = 0$ and $x_2 = 0$. The Threshold value is 1. What will be value of *y* _____



b) State any four activation functions used in ANN. Discuss these functions along with their properties. **[8]**

Q5) a) What are Self Organizing Feature Maps (SOFM). Justify with an example that "SOFMs are topology preserving networks". **[8]**

b) Differentiate between Feedback and Feed Forward Neural networks. **[8]**

OR

Q6) a) State the perceptron learning rule. Also explain its limitation and solution for the same. **[8]**

b) What is radial basis function network? Explain with architecture. **[8]**

Q7) a) How does Deep Learning overcome the challenges in conventional machine learning techniques? Draw and explain the architecture of Convolutional Neural Networks (CNN). **[10]**

b) Two images shown in figure below need to be convolved with stride = 2. Compute the resultant image pixels. **[8]**

2	3	7	4	6	2	9
6	6	9	8	7	4	3
3	4	8	3	8	9	7
7	8	3	6	6	3	4
4	2	1	8	3	4	6
3	2	4	1	9	8	3
0	1	3	9	2	1	4

$\ast$

Stride = 2

3	4	4
1	0	2
–1	0	3

OR

Q8) a) Why pooling layer is used in CNN architecture? Explain with suitable example. **[8]**

i) Max ii) Min and iii) Average pooling technique.

b) Let us consider a Convolutional Neural Network having three different convolutional layers in its architecture as: Layer-1: Filter Size - 3 x 3, Number of Filters - 10, Stride - 1, Padding - 0 Layer 1: Filter Size - 5 x 5, Number of Filters - 20, Stride -2, Padding - 0 Layer 3: Filter Size - 5 x 5, Number of Filters - 40, Stride - 2, Padding - 0 Layer 3 of the above network is followed by a fully connected layer. If we give a 3-D image input of dimension 39 X 39 to the network, then calculate input dimension of the fully connected layer. Draw architecture diagram for the convolutional neural network elaborated above. **[10]**

❄ ❄ ❄

Total No. of Questions : 10]

SEAT No. :

P113

[Total No. of Pages : 2

[5871]-616
B.E. (E & TC)
PLC & AUTOMATION
(2015 Pattern) (Semester - II) (Elective - III)

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.***

Q1) a) Explain servomechanism in detail. **[5]**

b) Explain the DPT with its applications. **[5]**

OR

Q2) a) An electronic loop controller outputs a signal of 8 mA to direct responding control valve. How far open should the control valve be at this manipulated variable signal level. **[5]**

b) Explain 2 - wire and 3 wire transmitter in detail. **[5]**

Q3) a) Explain cascade control in detail. **[5]**

b) Explain electrical signal transmission systems along with advantages. **[5]**

OR

Q4) a) Write short note on BLDC stepper motor. **[5]**

b) Explain PID control alongwith suitable ckt diagram. **[5]**

Q5) a) Explain following terms with respect to PLC. **[8]**

i) Input scan time ii) Output scan time

iii) Timers iv) Counters

b) Draw a ladder diagram for two-motor system having the following conditions : **[10]**

The start push button starts motor 1; 10sec later Motor 2 will start. The stop button stops motor1; 15seconds later motor 2 stops.

OR

P.T.O.

Q6) a) Explain selection criteria of PLC. **[8]**

b) Write a ladder diagram for typical car parking system **[10]**

Q7) a) Explain MTU and RTU along with their functions. **[8]**

b) Explain architecture of DCS in detail. **[8]**

OR

Q8) a) Explain the elements of SCADA. **[8]**

b) Compare PLC and SCAPA. **[8]**

Q9) a) Explain CNC machine along with its advantages & applications. **[8]**

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

i) CAN bus

ii) Ethernet

OR

Q10)a) What is the role of panel Engineering in automation? **[8]**

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

i) Foundation fieldbus

ii) TCP/IP protocol.

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

P114 **[Total No. of Pages : 2**

[5871]-617
B.E. (E & TC)
AUDIO AND SPEECH PROCESSING
(2015 Pattern) (Elective - III) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***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 articulation. **[8]**

b) Explain anatomy of human auditory system. **[6]**

c) Explain the autocorrelation method to estimate the Pitch of speech of the signal. **[6]**

OR

Q2) a) Explain anatomy and physiology of human speech production system. **[8]**

b) Compare mel scale and bark scale. **[6]**

c) What is spectogram?Explain significance of narrow band and broad band spectogram. **[6]**

Q3) a) Explain Levinson -Durbin recursive algorithm for calculation of predictor coefficients. **[8]**

b) With the help of a block diagram explain how MFCC coefficients are obtained from given speech signal. **[8]**

OR

Q4) a) Explain the basic principal of linear predictive analysis? Explain the method of finding LPC coefficients using autocorrelation method. **[8]**

b) Explain the procedure for computation of pitch and formants based on cepstral analysis of speech. **[8]**

P.T.O.

Q5) a) What is APCM?Compare APCM with companded PCM.Explain how companded PCM will improve the SNR of the signal. **[8]**

b) Describe sub band coding of speech.What are QMFs?How are QMFs uesd in sub band coding? **[8]**

OR

Q6) a) What is CELP? How is the codebook generated for CELP?what are the limitations of CELP. **[8]**

b) Explain the sinusoidal speech coding technique.How is it different from a harmonic coder? **[8]**

Q7) a) Write a short on online digital speaker verification system.AIso explain with block diagram ,the signal processing aspects of the speaker verification system. **[9]**

b) Explain how to perform isolated word recognition using Vector quantization. **[9]**

OR

Q8) a) What is speech enhancement? Explain spectral subtraction method of speech enhancement. **[9]**

b) Explain various steps involved in speaker recognition system.What is the difference between speaker recognition,speaker identification and speaker verification. **[9]**

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

P115 **[Total No. of Pages : 2**

[5871]-618
B.E. (E & TC)
SOFTWARE DEFINED RADIO
(Elective - III) (2015 Pattern) (Semester - II) (404191D)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Discuss the basic principle of software defined radio which makes it better than conventional radio systems. **[8]**

b) Discuss the Open Architecture of software defined radio in detail. **[6]**

c) Explain Frequency offset estimation and correction in multi-rate signal processing technique. **[6]**

OR

Q2)a) Explain the various characteristics of software defined radio and compare it with analog radio. **[8]**

b) Discuss the trade-off issues in using DSP, FPGA and ASIC in SDR system. **[6]**

c) Discuss the various sample timing algorithms. **[6]**

Q3) a) Discuss the various adaptive techniques used in smart antenna to achieve the beam forming. **[9]**

b) Draw and explain the block diagram of switched beam antenna array system. **[8]**

OR

Q4) a) Explain the benefits of Smart Antenna Phased Antenna Array. **[9]**

b) Explain with neat diagram the principle of space time block coding. **[8]**

P.T.O.

Q5) a) Explain the architecture of cognitive radio with suitable diagrams. **[9]**

b) Draw and discuss the block diagram of OFDM transmitter in brief. **[8]**

OR

Q6) a) Draw neat block diagram of OFDM receiver. Explain the function of FFT block. **[9]**

b) Discuss the effect of spectrum sensing and spectrum mobility on spectral efficiency? **[8]**

Q7) a) Write a short note on Embedded PSCR using GNU radio. **[8]**

b) Write a short note on Vertical Handoff in software defined radio. **[8]**

OR

Q8) a) Explain the various challenges and issues in the application of SDR advance communication system. **[8]**

b) Describe the issue of network interoperability in SDR in detail. **[8]**

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

P116 **[Total No. of Pages : 2**

[5871]-619

B.E. (Electronics & Telecommunication)

AUDIO VIDEO ENGINEERING

(2015 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) ***Draw neat diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume the suitable data, if necessary.***

Q1) a) Why is the (G-Y) difference signal not chosen for transmission? How this signal is obtained at receiver? **[5]**

b) Explain with block diagram, the working of colour TV receiver. **[5]**

OR

Q2) a) Compare Additive colour mixing & Subtractive colour mixing. **[5]**

b) Compare PAL, NTSC and SECAM colour TV systems. **[5]**

Q3) a) Explain the component coding in digital TV. **[5]**

b) Draw and explain a digital TV colour receiver. **[5]**

OR

Q4) a) Compare CAS & DTH **[5]**

b) Draw a neat block diagram of HDTV transmitter & explain the function of each block. **[5]**

Q5) a) What is IPTV? Explain characteristics and advantages of IPTV. **[8]**

b) What is mobile TV? What are its challenges and hardware requirements.**[8]**

OR

P.T.O.

Q6) a) Explain wi-fi TV with relevant block diagram. **[8]**

b) Compare IPTV and Internet TV. **[8]**

Q7) a) Write a short note on variable area method of optical recording. **[8]**

b) Explain principle of DVR. How it is differing from VCR. Compare DVR and VCR. **[10]**

OR

Q8) a) Write a short note on

i) Video on demand

ii) Conditional Access system (CAS) **[10]**

b) Compare VCD, DVD and blue ray. **[8]**

Q9) a) Draw the block diagram of PA system and explain. **[8]**

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

i) Absorption coefficient

ii) Reverberation time

iii) Studio acoustics

iv) Echo

OR

Q10)a) With the help of block diagram explain digital radio receiver. **[8]**

b) Explain the requirement of a good auditorium for pleasant listening? Give the features of acoustical design for an auditorium. **[8]**

Total No. of Questions :10]

SEAT No. :

P117

[Total No. of Pages : 2

[5871]-620
B.E. (Electronics and Telecommunication)
ROBOTICS
(2015 Pattern) (Semester - II) (Elective - IV) (404192A)

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) Define the anatomy of robot. **[5]**

b) Explain the terms: Hydraulic and Pneumatic Drives. **[5]**

OR

Q2) a) Define the terms: Actuators and Torque. **[5]**

b) List the characteristics of stepper motor and DC motor. **[5]**

Q3) a) Explain the basic structure of robot. **[5]**

b) Explain the magnetic and mechanical gripper in detail. **[5]**

OR

Q4) a) Explain image acquisition and processing technique. **[5]**

b) List out various Industrial applications of Robot. **[5]**

Q5) a) What are different parameters involved in Trajectory Planning. How trajectory planning is different for flexible joint than rigid joint. **[8]**

b) Explain the direct and indirect kinematics for industrial robots for position. **[8]**

OR

Q6) a) Explain the Newton Euller formulation used for a robotic manipulator. **[8]**

b) Explain in detail Lagrangian formulation. **[8]**

P.T.O.

Q7) a) Explain in detail Line following algorithms. **[8]**

b) Explain in detail Robot Language structure, its element and structure. **[8]**

OR

Q8) a) Explain in detail Robot Language Classification. List different software used in control of robot. **[8]**

b) Explain an algorithm for Sensing distance and direction of Robot. **[8]**

Q9) a) Explain the models of flexible link and joints. **[9]**

b) In detail explain case study of : Robots in material handling and assembly. **[9]**

OR

Q10) a) Explain a model for mechanical arms and lifting systems. **[9]**

b) In detail explain case study of : Human Robot Interaction. **[9]**

Total No. of Questions :10]

SEAT No. :

P118

[Total No. of Pages : 2

[5871]-621
B.E. (E. & T.C.)
BIOMEDICAL ELECTRONICS
(2015 Pattern) (Semester - II) (Elective - IV) (404192B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List different Bio potential electrode. Explain drawback of surface electrode. **[5]**

b) Explain cell structure with Bio cell potential **[5]**

OR

Q2) a) Explain the technique to reduce the artifacts in bio signal. **[5]**

b) Explain in detail bipolar lead configuration to acquire ECG. **[5]**

Q3) a) Explain various heart sounds generated in the pumping activity of heart. **[5]**

b) Explain the EEG application for sleep apnea. **[5]**

OR

Q4) a) Explain β, δ in relation with EEG. **[5]**

b) Write short note on phonocardiography. **[5]**

Q5) a) Explain in detail the write leg drive mechanism **[8]**

b) Explain grounding & shielding techniques for medical equipment. **[8]**

OR

P.T.O.

Q6) a) Explain in detail the isolation amplifier used in ECG recording system. **[8]**

b) Explain the technique to cancel out maternal ECG from fetal ECG. **[8]**

Q7) a) Explain in detail the method for muscle noise filtering. **[8]**

b) Explain ECG classification for normal and abnormal state using Multilayer Perception. **[8]**

OR

Q8) a) Write down the algorithm for QRS detection. **[8]**

b) What are the objectives of Biomedical signal analysis? Explain ECG signal processing for base line interference. **[8]**

Q9) a) What is systolic and diastolic pressure? Explain non - invasive blood pressure measurement technique. **[10]**

b) Explain operation of X-ray machine with help of neat block diagram. **[8]**

OR

Q10)a) Classify pacemaker on the basis of pacing modes & explain any one in brief. **[10]**

b) Explain merits & demerits of MRI system. **[8]**

Total No. of Questions : 8]

SEAT No. :

P119

[Total No. of Pages : 2

[5871]-622
B.E. (Electronics & Telecommunication)
WIRELESS SENSOR NETWORK
(2015 Pattern) (Semester - II) (Elective-IV) (404192 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,***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitrie data, if necessary.***

Q1) a) Explain operating system of WSN in terms of Tasks Threads and Events **[6]**

b) Compare sensor MAC and BMAC **[8]**

c) Explain cross layer Protocol stock **[6]**

OR

Q2) a) What is wireless sensor Network? Explain with sample applications. **[8]**

b) Give significance of Naming and Addressing in WSN. **[6]**

c) Write note on (any two) **[6]**

i) Zigbee

ii) Wibree

iii) BLE

Q3) a) What is localization? Explain its need **[8]**

b) What are various routing scenarios in WSN? **[8]**

OR

Q4) a) Explain Range Based localization in WSN **[8]**

b) Explain **[8]**

i) Collection Tree Protocol

ii) Multi-hop communications

P.T.O.

Q5) a) Write a note on In Network Processing and Data Aggregation **[10]**

b) How security plays on important role in WSN Explain. **[8]**

OR

Q6) a) What are various security protocols in WSN? Explain one in detail **[10]**

b) Explain Denial of service attack at network layer **[8]**

Q7) a) Write a note on Early WSN Deployments **[8]**

b) Explain Bottom -up implementation process in WSN deployments. **[8]**

OR

Q8) a) What are general problems for Deploying WSN applications? **[8]**

b) What are steps involved in requirement analysis of WSN. **[8]**

Total No. of Questions : 08]

SEAT No. :

P120

[Total No. of Pages : 2

[5871]-623

B.E. (Electronics & Telecommunication)

RENEWABLE ENERGY SYSTEMS

(2015 Pattern) (Semester - II) (404192-D) (Elective-IV)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8,***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate ful marks.***
4) ***Use of non programmoble calculater is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Briefly write about different forms of energy and explain energy conservation & energy efficiency. **[8]**

b) Explain the different types of solar collectors. **[6]**

c) Explain with neat diagram operation of solar water heater system. **[6]**

OR

Q2) a) Define co-generation and explain how it deals with topping and bottoming cycle. **[8]**

b) Determine the local apparant time corresponding to 13.50 IST on July1 at Delhi (28°35'N 12'E). The equation of time correction on July1 is-4 times. In India, the standard time is based on 82.50' E **[6]**

c) Explain the current voltage characteristics of solar cell. Define efficiency of solar cell and Explain limits to cell efficiency. **[6]**

Q3) a) Describe with neat sketch the working of wind energy converter system (WECS) with main components. **[8]**

b) With the help of neat sketch, Explain different types of rotors used in wind turbines **[8]**

OR

P.T.O.

Q4) a) Discuss the different types of wind - turbines used to Extract wind energy. **[8]**

b) What are the advantages and disadvantages of wind energy systems. **[8]**

Q5) a) List the different geothermal resources and Explain in details **[8]**

b) Discuss different ways of geothermal power generation and Explain in details with neat block diagram. **[8]**

OR

Q6) a) Explain the basic principles of ocean thermal energy conversion system (OTEC) and Explain Closed cycle OTEC System. **[8]**

b) What are the advantages and disadvantages of geothermal energy and Explain main applications of geothermal energy. **[8]**

Q7) a) Define fuel cell. Explain the working principles of an acidic fuel cell. **[8]**

b) List different types of fuel cell, Explain any two in details. **[6]**

c) Write a short note on fuel Processor. **[4]**

OR

Q8) a) Explain molten corbonate fuel cell with neat diagram **[8]**

b) What are the advantages and disadvantages of fuel cell power plant. **[6]**

c) Draw and Explain operating characteristics of fuel cells. **[4]**

Total No. of Questions : 8]

SEAT No. :

P965

[Total No. of Pages : 2

[5871]-624

B.E. (Electronics & Telecommunication/Electronics)

ADVANCED AUTOMOTIVE ELECTRONICS

(2015 Pattern) (Semester - II) (404192DA) (Open Elective)

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

Instructions to the candidates:

1) ***Answers Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is Tire pressure monitoring system? How does it work? Explain direct TPMS system. **[8]**

b) What do you mean an Ignition in IC engine? Explain each component in short. **[8]**

c) Explain the necessity to detect crankshaft position and cam position. **[4]**

OR

Q2) a) Compare the firing order for four and six cylinder engines. Explain the necessity of firing order in multicylinder engines and what are the mixture limits for inflammability & different air fuel mixtures on which an engine can operate. **[8]**

b) Explain various operating models of Hybrid technology and compare advantages and disadvantages of each. **[8]**

c) List out the different actuators used in electronic engine management and mention where they are used. **[4]**

Q3) a) Write in detail various applications of telematics in automotive domain. **[6]**

b) Compare Various types of automotive buses. **[6]**

c) What is General Packet Radio Service (GPRS) and its use in automotive. **[4]**

OR

Q4) a) What is need of MOST? List devices that can be connected and BW requirement of each. **[6]**

b) Write a note about wireless LAN standards and their applications in automobiles. **[6]**

c) Comment on Ethernet and its applications in automotive domain. **[4]**

P.T.O.

Q5) a) Explain electronic steering control system and automatic rain operated wiper control. **[6]**

b) What is engine management system? Explain with neat block diagram how it works in various operation modes. **[6]**

c) What are the potential approaches of model based development. **[4]**

OR

Q6) a) State the strategic issues & guidelines for adopting model-based development in automotive industry. **[6]**

b) Explain the role of Model based development in Automotive embedded systems development. **[6]**

c) State procedure to analyze the costs and benefits of model-based software development in automotive industry. **[4]**

Q7) a) Discuss concept of multiplexed wiring? Explain with diagram how it is implemented. **[6]**

b) Write a note on fault code readers & scan tools. **[6]**

c) What do you mean by Range to object in anti-collision warning system? **[6]**

OR

Q8) a) Explain necessity of functional safety. Compare active safety & passive safety. **[6]**

b) What is on-board Diagnostics? Explain operation cycles in on-board diagnostics. **[6]**

c) Describe how to test the operation of an ABS wheel speed sensor & method of testing a damper. **[6]**

Total No. of Questions : 8]

SEAT No. :

P121

[Total No. of Pages : 2

[5871]-625

B.E. (Electronics & Telecommunication/Electronics)

INDUSTRIAL INTERNET OF THINGS

(2015 Pattern) (Semester - II) (404192DB) (Open Elective)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What are various IoT platforms? Explain any one. **[7]**

b) Explain HART protocol. **[6]**

c) What is role of WSN in IIoT? **[7]**

OR

Q2) a) Write difference between IoT & IIoT. **[6]**

b) Write difference between IoT & M2M **[7]**

c) What are criteria for selection of sensors in IIoT system Design. **[7]**

Q3) a) What is 6 LOWPAN? Write its application. **[8]**

b) What is role of BLE in IoT or IIoT system. **[8]**

OR

Q4) a) Explain physical Layer details of Zigbee. **[8]**

b) What is MQTT? Write its application. **[8]**

Q5) a) What is relationship of conventional web security & IIoT security? Explain. **[8]**

b) Explain any security model used in IIoT. **[8]**

OR

P.T.O.

Q6) a) Why security is important in IIoT? Explain with example. **[8]**

b) What are security requirements in IoT? **[8]**

Q7) a) Explain any 4 functions used in R for data analytics. **[8]**

b) Write application of IIoT in chemical plant. **[10]**

OR

Q8) a) Write about home automation using IoT. **[10]**

b) Why do you think data analytics is important aspect of IoT? **[8]**

Total No. of Questions : 10]

SEAT No. :

P122

[Total No. of Pages : 2

[5871]-627

B.E. (Electronics & Telecommunications/ Electronics)

DATA SCIENCE & ANALYTICS

(2015 Pattern) (Semester - II) (4041902DD) (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) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define DBMS. Explain advantages of DBMS. **[6]**

b) Explain Create, update and delete commands of SQL with example. **[4]**

OR

Q2) a) Discuss role of data scientist in analytics projects. **[6]**

b) What is data abstraction? Discuss different levels of data abstraction. **[4]**

Q3) a) Enlist different features of SQL and PL/SQL. **[4]**

b) Enlist & explain applications of data base management system. **[6]**

OR

Q4) a) What is structured and unstructured data? differentiate structured & un structured data. **[6]**

b) Discuss PL/SQLtrigger with suitable example. **[4]**

Q5) a) Enlist and explain needs of data Analytics lifecycle. Explain in detail. **[9]**

b) What is data discovery? Explain data discovery in detail. **[9]**

OR

Q6) a) Explain steps of data preparation in detail. **[9]**

b) What is model planning? Explain in short. **[9]**

P.T.O.

Q7) a) What is Data exploration? Discuss data exploration in detail. **[8]**

b) Discuss data visualization with suitable examples. **[8]**

OR

Q8) a) Discuss any two generic functions with suitable examples in R-Programming. **[8]**

b) Explain different types of data in R-Programming. **[8]**

Q9) a) Explain Aprior algorithm in detail. **[8]**

b) What unsupervised learning? Discuss any one algorithm of unsupervised learning. **[8]**

OR

Q10)a) What is logistic regression? Explain logistic regression with suitable example. **[8]**

b) Explain Naive Bayesian Classification in detail. **[8]**

Total No. of Questions : 8]

SEAT No. :

P123

[Total No. of Pages : 2

[5871]-628
B.E. (Electronics)
VLSI DESIGN
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Explain CMOS inverter transfer characteristics in detail. What is Bn/Bp ratio? How to achieve this? **[8]**

b) What is DRC? Explain in detail design rules in CMOS VLSI DESIGN. **[8]**

c) Write a short note on technology scaling. **[4]**

OR

Q2) a) Explain in detail static and dynamic power dissipation. what are the components which makes power dissipation in CMOS circuit? **[8]**

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

i) Body effect

ii) Hot electron effect

iii) Velocity saturation

iv) Power delay product.

c) Write a short note on Transmission gates. **[4]**

Q3) a) What are different wire parasitics? How do they play important role in routing. **[8]**

b) Explain clock skew with an example? How to minimize the effect of clock skew? **[8]**

OR

Q4) a) What are different power distribution techniques available for the VLSI Design. **[10]**

b) Explain in detail timing consideration. **[6]**

P.T.O.

Q5) a) Draw the block diagram and explain architecture of CPLD. **[8]**

b) What is the need of PLD? Explain technologies involved in detail **[8]**

OR

Q6) a) Explain the difference between logic implemented in CPLD and logic implemented in FPGA. **[8]**

b) Explain Boundary scan technique. **[8]**

Q7) a) Explain the need of DFT with suitable examples. **[8]**

b) Explain fault models in detail. **[10]**

OR

Q8) Write short note on **[18]**

i) BIST

ii) JTAG

iii) TAP controller

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Total No. of Questions : 8]

SEAT No. :

P124

[Total No. of Pages : 2

[5871]-629
B.E. (Electronics)
ADVANCED POWER ELECTRONICS
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With the help of neat circuit diagram & waveform explain operation of single phase Dual converter. **[6]**

b) Discuss single phase Bridge Diode clamped multilevel inverter with circuit diagram & waveform. **[8]**

c) With circuit diagram & waveform explain single phase full converter drive for series excited DC motors. **[6]**

OR

Q2) a) State the different methods for power factor improvement & explain any one with circuit diagram & waveform. **[6]**

b) Discuss with circuit diagram & waveform step down cycloconverter for o/p frequency equal to half of input frequency. **[6]**

c) Explain motoring, regenerative braking, dynamic braking & plugging operating modes of DC motor. **[8]**

Q3) a) With neat block diagram explain closed loop control of Induction motor. **[8]**

b) State different speed control methods in Induction Motor. Explain any one in detail with characteristics. **[8]**

OR

Q4) a) Discuss with the help of suitable circuit diagram and waveforms the working of variable frequency square wave VSI drive for Induction motor. **[8]**

b) Explain Indirect vector control for Induction motor with block diagram. **[8]**

P.T.O.

Q5) a) Explain the working of variable reluctance stepper motor drive with neat constructional diagram. **[10]**

b) State types of DC servo motor & explain any one in detail with circuit diagram. **[8]**

OR

Q6) a) Discuss the operation of switched reluctance motor Drive. **[8]**

b) Withe neat diagram explain the operation of Brushless D.C. motor drive. **[10]**

Q7) a) With neat diagram explain stand alone wind energy system. **[8]**

b) Discuss wind generator control of wind turbine. **[8]**

OR

Q8) a) Discuss PV characteristics & working of solar power system with neat diagram. **[8]**

b) Explain net metering in solar power system. **[8]**

Total No. of Questions : 10]

SEAT No. :

P125

[Total No. of Pages : 2

[5871]-630
B.E. (Electronics Engineering)
ELECTRONICS SYSTEM DESIGN
(2015 Pattern) (Semester - I) (404203)

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

Instructions to the candidates:

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

Q1) a) Explain in detail various stages used in New Product Development. **[6]**

b) Explain various techniques used to ensure reliability and quality of electronic products. **[4]**

OR

Q2) a) State and explain specifications considered for selection of ADC **[6]**

b) Explain the significance of following terms of DAC: **[4]**

i) Resolution.

ii) Offset error.

Q3) a) Compare serial interface & parallel interface in micro-controller. **[4]**

b) Explain CAN, I2C & LIN with their applications & limitations. **[6]**

OR

Q4) a) Compare different types of microcontroller architecture & selection criteria of microcontrollers. **[5]**

b) Explain need of Instrumentation Amplifier in analog signal conditioning. Also explain different errors which occur in Instrumentation amplifier. **[5]**

Q5) a) With the help of diagram, explain different phases of software design. **[8]**

b) What is mean by FSM? Explain use of FSM in electronics product design. **[8]**

OR

P.T.O.

Q6) a) Explain with neat diagram different constructs of regular programming. **[8]**

b) Explain factors which affect the choice of assembly language & high level language. Justify your answer with suitable examples. **[8]**

Q7) a) Explain the term Signal Integrity? Explain various factors that affect Signal Integrity in high speed digital circuits. **[6]**

b) The supply and ground traces are running exactly symmetric on the opposite sides of PCB. The total length in common is 300 mm., the supply trace width is 4 mm. and the ground trace width is 6 mm. The lamination used having relative dielectric constant 5.4. Calculate the capacitance between these two traces. **[5]**

c) Explain rules of PCB Design for Digital circuits. **[6]**

OR

Q8) a) Explain rules of PCB design for Shielding & Guarding in precision circuits. **[5]**

b) Discuss Routing technology configurations used in PCB design. **[6]**

c) State and explain the parameters considered while designing an enclosure of Electronic product. **[6]**

Q9) a) Discuss the circuit of transistor based LC Oscillator? Explain in detail how DC & AC analysis can be used for troubleshooting. **[9]**

b) Explain how will you diagnose faults in high speed digital circuits using Logic Analyzer. **[8]**

OR

Q10)a) Explain Significance of Bandwidth, sampling rate, probe impedance, memory depth in DSO. **[8]**

b) Draw the block diagram of DSO ? Explain how it is better than CRO in testing & trouble-shooting electronic circuits. **[9]**

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Total No. of Questions : 5]

SEAT No. :

P966

[Total No. of Pages : 2

[5871]-631
B.E. (Electronics)
DIGITAL IMAGE AND VIDEO PROCESSING
(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherver necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data, if necessary.***

Q1) Solve any two questions :

a) Explain with neat diagram, the fundamental step in digital image processing. **[5]**

b) How image sharpening and image smoothing is done in image enhancement. **[5]**

c) Explain with the help of block diagram, explain JPEG Compression. **[5]**

Q2) Solve any two questions :

a) What are primary and secondary color models? Write conversion functions for the following model transformations : **[5]**

i) RGB to HSI

ii) RGB to YIQ.

b) Explain Inverse Filtering & Wiener filtering process in digital image processing. **[5]**

c) Explain MPEG standards. **[5]**

Q3) a) State the concept of Region growing, region splitting and merging with example. **[12]**

b) What is Laplacian Edge Detector? Explain why LoG is preferred over Laplacian for edge detection. **[6]**

P.T.O.

Q4) a) Explain the principle of color Video processing. **[8]**

b) Write a brief note on 2-D motion models. **[8]**

Q5) a) Write a note on applications of motion Analysis. **[8]**

b) Explain the block matching algorithm. **[8]**

Total No. of Questions : 8]

SEAT No. :

P967

[Total No. of Pages : 2

[5871] - 632

B.E. (Electronics)

AUDIO AND SPEECH PROCESSING

(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates :

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

Q1) a) Explain Discrete time Model of Speech Production System? **[6]**

b) Explain Pitch Period Estimation of speech signal using short-time autocorrelation? **[8]**

c) Explain Pitch Period Estimation based on FFT techniques? **[6]**

OR

Q2) a) Explain acoustic theory of Speech production? **[6]**

b) Explain the terms Energy, Zero-Crossing, AMDF with respect to Speech Signal? **[8]**

c) Explain Pitch Period Estimation based on harmonic peak detection method? **[6]**

Q3) a) Explain concept of vocoders? Explain Concept of cepstral vocoders? **[6]**

b) Explain Concept of Vector Quantization Coder? **[5]**

c) Explain Perceptual Audio Coding? **[5]**

OR

Q4) a) Explain MPEG audio Standards? **[5]**

b) Explain Concept of sub-band coding of speech signal? **[6]**

c) Write a short note on Spectral coders? **[5]**

P.T.O.

Q5) a) What are the factors which decide Choice of LPC Order and Window length? **[6]**

b) Write a short note on Lattice structure formulation? **[5]**

c) Explain Frequency Domain interpretation of LPC? **[5]**

OR

Q6) a) Explain Concept of LPC in Speech Processing? Explain its importance and applications? **[6]**

b) Explain Levinson-Durbin Algorithm? **[5]**

c) Explain Significance of LPC Coefficients? **[5]**

Q7) a) Explain steps involved in Automatic Speech Recognition(ASR). **[6]**

b) Explain Statistical Signal Modeling of Speech Signal? **[6]**

c) What are different Speech Enhancement Techniques? Explain any one technique of Speech Enhancement? **[6]**

OR

Q8) a) Explain steps involved in Speaker Recognition(SR) systems. **[6]**

b) What Linear and Dynamic Time Warping(DTW) in Speech Signal? **[6]**

c) Explain steps involved in Text to Speech Conversion? **[6]**

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Total No. of Questions : 8]

SEAT No. :

P126

[Total No. of Pages : 2

[5871] - 633

B.E. (Electronics Engineering)

EMBEDDED SYSTEMS AND RTOS (Elective - I)

(2015 Pattern) (Semester - I)

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

Instructions to the candidates :

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

Q1) a) What is the role of PLL in LPC 1768? Explain PLL Control (PLLCON) registers and PLL Configuration (PLLCFG) register associated with PLL in LPC 1768. **[6]**

b) Explain the following :

i) Memory requirement for embedded system. **[6]**

ii) Static and dynamic priority of task.

c) What is Semaphore? Explain binary and counting type semaphore. How does it helps in resource sharing in RTOS kernel? Compare Semaphore and Mutex. **[8]**

OR

Q2) a) Explain optimization of following design metrics **[6]**

i) Time to market ii) NRE and Unit cost

b) Explain two types of RTOS used for embedded system. Compare general purpose operating system and RTOS. **[6]**

c) Explain the following functions related to μC/OS-II in detail. **[8]**

i) OSSemAccept ( ) ii) OSMboxPost ( )

iii) OSTimeDlyHMSM ( ) iv) OSTaskQuery ( )

Q3) a) Why hard drive is not suitable for embedded system? Explain flash memory used in embedded system. State advantages and limitations of flash memory? Why NAND flash is preferred over NOR flash? **[8]**

b) Explain binary utilities and GNU debugger cross development tools in embedded Linux. **[8]**

P.T.O.

OR

Q4) a) Draw and explain block diagram of cross development environment used for Embedded Linux. **[8]**

b) Explain Storage Considerations in Embedded Linux. **[8]**

Q5) a) What is role of boot loader in embedded Linux? Explain various challenges for boot loader design in embedded Linux. **[8]**

b) What is meant by device driver? Explain different types of drivers. Explain various steps for developing Linux kernel module/Linux Device Driver. **[8]**

OR

Q6) a) State file system layout concept in embedded Linux. Explain it in details with metadata concept. **[8]**

b) Explain in detail the different steps in Linux kernel configuration. **[8]**

Q7) a) Explain automatic chocolate vending machine with suitable block diagram and state its hardware requirement. **[6]**

b) Explain Hardware and software co-design in Embedded system. **[6]**

c) With neat diagram explain development process for embedded system. **[6]**

OR

Q8) a) Explain the any two hardware laboratory tools required for embedded system design. **[6]**

b) Explain in brief the following software development tools for embedded system. **[6]**

i) Simulator

ii) Cross Assembler and Compiler

iii) Linker and Locator

c) Explain with diagram how In-circuit Emulator (ICE) is useful for testing embedded system. **[6]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P127

[Total No. of Pages : 2

[5871] - 634

B.E. (Electronics)

INTERNET OF THINGS (Elective - I)

(2015 Pattern) (Semester - I) (404204 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.***
2) ***Figures to the right side indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Describe various functional blocks of IoT. **[8]**

b) What is HART Protocol? How is it useful in IoT. **[6]**

c) What are various features of WSN? Describe any two. **[6]**

OR

Q2) a) What are various enabling technologies of IoT? Describe any two. **[8]**

b) Describe MQTT protocol. **[6]**

c) What three service models in cloud? **[6]**

Q3) a) Write a program to display temperature and humidity for aurdino board interfaced with DHT 11 Sensor. **[8]**

b) Describe various ports available on Raspberry Pi board. **[8]**

OR

Q4) a) Describe various features of an aurdino board. **[8]**

b) Describe how do you sense the data and upload on the cloud using Raspberry Pi? **[8]**

Q5) a) Explain qualitative & quantitative data analytics techniques. **[8]**

b) Compare conventional big data & IoT generated big data. **[8]**

P.T.O.

OR

Q6) a) What is Hadoop? Explain its use in IoT. **[8]**

b) Describe any one data analytics platform. **[8]**

Q7) a) What are industrial standards of IoT? **[10]**

b) Describe use of IoT in smart City applications. **[8]**

OR

Q8) a) Describe use of IoT in plant automation. **[10]**

b) Describe use & IoT in Health care. **[8]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P128

[Total No. of Pages : 2

[5871] - 635

B.E. (Electronics)

SOFTWARE DEFINED RADIO

(2015 Pattern) (Semester - I) (404204E) (Elective - I)

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

Instructions to the candidates :

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

Q1) a) Draw & explain the model of a practical software radio. **[8]**

b) Explain design principles using FPGA in SDR. **[6]**

c) What is the benefits of using the multi stage structures of decimeter or interpolator when large changes of sampling rates are required? **[6]**

OR

Q2) a) Explain the various characteristics of the RF front-end topologies. **[8]**

i) Sensitivity ii) Dynamic range

iii) Spurious response iv) Stability

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

i) Software Communication Architecture (SCA)

ii) FPGA in SDR

iii) ADC and DAC distortions

c) Explain decimation process with spectral diagram. **[6]**

Q3) a) Define CR, Explain with neat diagram cognitive cycle in CR. **[9]**

b) Explain in brief various capabilities of CR. **[8]**

OR

Q4) a) What is dynamic spectrum access? Discuss IEEE 1900.1 and 1900.2 standards each in brief. **[9]**

b) Explain the need applications of OFDM in CR. **[8]**

P.T.O.

Q5) a) Explain Spectrum Sensing in CR also compare different spectrum sensing techniques. **[9]**

b) Draw and explain the block diagram of Cognitive radio network. **[8]**

OR

Q6) a) Discuss the Objectives, Benefits, and Applications of CR. **[9]**

b) Explain in detail Topology aware CRN Architecture with neat diagram. **[8]**

Q7) a) Explain the applications of SDR and CR. **[8]**

b) Write short note on Embedded PSCR with GNU Radio. **[8]**

OR

Q8) a) Explain and Compare Vertical and Horizontal Handoff in SDR. **[8]**

b) Describe the different Modes of PSCR in detail. **[8]**

▽▽▽▽

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

P129 **[Total No. of Pages : 2**

[5871]-636

B.E. (Electronics Engineering)

MOBILE COMMUNICATION

(2015 Pattern) (Semester - I) (404205 A) (Elective - II)

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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) What are different Spread spectrum modulation techniques, explain in detail. **[7]**

b) Explain Small scale multipath propagation. Elaborate Impulse response model of multipath channel. **[7]**

c) Explain for communications frequency reuse, channel assignment strategies, handoff strategies. **[6]**

OR

Q2) a) Give an Overview of 2G, 2.5G, 3G, 4G, 5G wireless networks. **[7]**

b) What are different Diversity techniques used in Mobile Communications. **[7]**

c) Write short note on types of small scale fading. **[6]**

Q3) a) Explain Basic GSM Architecture in details. **[8]**

b) Explain Interleaving in Mobile Communications. **[8]**

OR

Q4) a) Explain GSM burst structure. **[8]**

b) Write short note on Logical Channels in GSM. **[8]**

P.T.O.

Q5) a) Explain CDMA2000: Overview, Radio & Network Components. **[8]**

b) Explain Handover in TD-SCDMA. **[8]**

OR

Q6) a) Explain Mobility Management and Power Optimization in 4G LTE. **[8]**

b) Explain Interference - Mitigation Techniques in TD-CDMA. **[8]**

Q7) a) Explain SS7 in detail **[9]**

b) Write a short note on ISDN **[9]**

OR

Q8) a) Explain Traffic routing in wireless networks. **[9]**

b) Explain Protocols for network access. **[9]**

Total No. of Questions : 8]

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[5871] - 637
B.E. (Electronics)
BIOMEDICAL ELECTRONICS
(2015 Pattern) (Elective - II) (404205B)

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.***
1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right side indicates full marks.***
3) ***Use of Calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Draw and explain the block diagram of biomedical instrumentation system. **[8]**

b) Define action potential, resting potential, polarization and depolarization of cell with neat sketch. **[6]**

c) Explain SA node and AV node in electro conduction system of heart. **[6]**

OR

Q2) a) Explain the different types of Electrodes used in biomedical systems with their properties and the material used for the same. **[8]**

b) Draw and explain the diagram of ECG amplifier. **[6]**

c) Draw and explain the 10-20 Electrodes Systems for EEG Recording. **[6]**

Q3) a) Write a note on the Grounding and Shielding? **[8]**

b) Write a note on the adaptive filter? **[8]**

OR

Q4) a) Explain in detail the write leg drive mechanism. **[8]**

b) Explain the technique to cancel out maternal ECG from fetal ECG. **[8]**

P.T.O.

Q5) a) Explain in detail the method for muscle noise filtering. **[8]**

b) Write down the algorithm for QRS detection. **[8]**

OR

Q6) a) Explain ECG classification for normal and abnormal state using Multilayer perception. **[8]**

b) What is Base line and Power line Interference? Explain the techniques to remove base line and power line interference. **[8]**

Q7) a) Explain CT Scanner working principle and scanning system. **[10]**

b) Explain how laser are used in vision correction. **[8]**

OR

Q8) a) What is biotelemetry? Explain the component of biotelemetry system. **[10]**

b) Explain merits and demerits of MRI system. **[8]**

Total No. of Questions : 8]

SEAT No. :

P131

[Total No. of Pages : 2

[5871] - 638
B.E. (Electronics)
OPTIMIZATION TECHNIQUES
(Semester-I) (2015 Pattern) (Elective - II) (404205 C)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
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) Solve graphically. **[10]**

Maximize $z = 200x_1 + 400x_2$

Subject to $x_1 + 3x_2 \geq 400$

$x_1 + 2x_2 \leq 350$

$x_1 + x_2 \geq 200$

$x_1 \geq 0, x_2 \geq 0$

b) Solve the following problem using duality **[10]**

Maximize $z = 5x_1 + x_2$

Subject to $3x_1 + x_2 \geq 6$

$x_1 - 2x_2 \geq 2$

$2x_1 + 5x_2 \geq 10$

$x_1 \geq 0; x_2 \geq 0$

OR

Q2) a) Solve using Lagranges method **[10]**

Maximize $z = x_1^2 + 3x_2^2 + 5x_3^2$

Subject to $x_1 + x_2 + 3x_3 = 2$

$5x_1 + 2x_2 + x_3 = 5$

$x_1, x_2, x_3 \geq 0$

b) Using KKT conditions solve **[10]**

Maximize $z = 2x_1 + 3x_2$

Subject to $x_1^2 + x_2^2 \leq 20$

$x_1 x_2 \leq 8$

$x_1, x_2 \geq 0$

P.T.O.

Q3) a) Explain steps in dichotomous search method with example. **[9]**

b) Explain Powells Quadratic Interpolation method. **[9]**

OR

Q4) Minimize $f(\lambda) = (\lambda)^4 - 4(\lambda)^3 - 6(\lambda)^2 - 16\lambda + 4$ using interpolation method. **[18]**

Q5) Minimize $f(x_1, x_2) = x_1^2 - x_1x_2 + 3x_2^2$ using the Newton Raphson method. Take starting point $(1, 2)^T$. Solve the problem with classical method and verify your answer. **[16]**

OR

Q6) Minimize $f(x_1, x_2) = x_1^2 - 2x_1 + 1 + x_2^2$ using the Steepest descent method. Take starting point $(0,0)^T$. Verify your answer using classical method. **[16]**

Q7) Apply the Beale's method for solving the following quadratic programming problem. **[16]**

Maximize $Q(x) = 4x_1 + 6x_2 - 2x_1^2 - 2x_1x_2 - 2x_2^2$

Subject to $x_1 + 2x_2 \leq 2$

$x_1, x_2 \geq 0$

OR

Q8) Explain with examples & mathematical equations. **[16]**

a) Unconstrained nonlinear programming problems.

b) Constrained nonlinear programming problems.

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Total No. of Questions : 8]

SEAT No. :

P968

[Total No. of Pages : 2

[5871]-639
B.E. (Electronics)
COMPUTER MODELING AND SIMULATION
(2015 Pattern) (Semester - I) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) With the help of flowchart explain steps of simulation study. **[8]**

b) Explain Simulation of inventory systems. **[6]**

c) State expression for any five Steady-State Parameters of the M/G/1 queue. **[6]**

OR

Q2) a) What is calling population? Explain in detail. **[6]**

b) Explain how link lists are used for dynamic memory allocation. **[8]**

c) Write short note on Empirical Continuous Distributions. **[6]**

Q3) a) Discuss number of ways to obtain information about a process even if data are not available. **[8]**

b) What is Goodness of fit test? Explain Kolmogorov-Smimov Goodness-of Fit Test. **[10]**

OR

Q4) a) What is Goodness of fit test? Explain. **[18]**

i) Chi-Square Test

ii) Chi-Square Test with Equal Probabilities

P.T.O.

Q5) a) Enlist types of simulation with output analysis and explain in brief. **[8]**

b) What is Error Estimation for Steady-State Simulation? Explain in brief. **[8]**

OR

Q6) a) Explain Initialization Bias in Steady-State Simulations. **[8]**

b) What is Replication Method for Steady-State Simulations? Explain in brief. **[8]**

Q7) a) Explain Issue Modeling Downtimes and Failures In Manufacturing And Material Handling Simulations. **[8]**

b) Explain process orientation and event orientation simulation tools in simulation of computer system. **[8]**

OR

Q8) a) Explain models of manufacturing system & models of material handling system. **[8]**

b) Explain Issue Trace-driven models In Manufacturing And Material Handling Simulations. **[8]**

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Total No. of Questions : 8]

SEAT No. : ____

P132

[Total No. of Pages : 2

[5871]-640

B.E. (Electronics)

DIGITAL SIGNAL PROCESSOR TMS320C67X

(2015 Pattern) (Semester - I) (Elective - II) (404205E)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculators is allowed.***

Q1) a) Discuss the computer architectures for signal processing and state the need for DSP processors. **[6]**

b) Differentiate the internal and external memory modes of TMS 320C67XX. **[8]**

c) Contrast and compare parallel and pipeline operations. **[6]**

OR

Q2) a) With the help of neat sketch, explain the architecture of TMS32OC67X. **[6]**

b) Discuss the following on-chip peripherals: **[8]**

i) Hardware timer

ii) Host Port Interface (HPI)

iii) Clock generator

iv) Serial input-output ports

c) What are the control register of DSP processors. **[6]**

P.T.O.

Q3) a) Explain PLL controller registers used in TMS32OC67X. **[9]**

b) Explain with a neat block diagram major blocks of the McASP. **[9]**

OR

Q4) a) Explain 12C Module Conceptual Block Diagram for TMS32OC67X DSP processor. **[9]**

b) Explain power-down mode in DSP processor TMS32OC67X. **[9]**

Q5) a) Explain how Correlation is implemented using TMS32OC67X DSP processor. **[8]**

b) Explain how Hilbert transforms is implemented using TMS32OC67X DSP processor. **[8]**

OR

Q6) a) Explain how Digital filtering is implemented using TMS32OC67X DSP processor. **[8]**

b) Explain the need of Adaptive filter. Explain the principle of adaptive filter. **[8]**

Q7) a) Write a short note on Power-line monitoring using TMS32OC67X DSP processor. **[8]**

b) Write a short note on use of TMS32OC67X DSP processor in robotics. **[8]**

OR

Q8) Write a short note on Use of TMS32OC67X DSP processor in **[16]**

a) Security access

b) Numeric control

Total No. of Questions : 8]

SEAT No. :

P133

[Total No. of Pages : 2

[5871]-641

B.E. (Electronics Engineering)

COMPUTER NETWORKS & SECURITY

(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
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 ISO - OSI model in detail. **[8]**

b) Explain LEO/MEO/GEO in detail with applications. **[6]**

c) Explain sliding window protocol in detail. **[6]**

OR

Q2) a) Explain TCP/IP reference model in detail. **[8]**

b) Explain guided media in brief with suitable applications. **[6]**

c) Explain CSMA/CD protocol. **[6]**

Q3) a) Describe various classes in IP addressing and give applications of each. **[6]**

b) Explain shortest path Algorithm. **[6]**

c) Explain ARP & RARP protocol in detail. **[4]**

OR

Q4) a) Explain in detail ICMP & IGMP protocol. **[6]**

b) Explain lasheet is mean by congestion & quality of service in computer network. **[6]**

c) Compare UDP & TCP. **[4]**

P.T.O.

Q5) a) What is FTP? Describe in brief. **[8]**

b) Write short note on DNS. **[6]**

c) How do PING & TRACE ROUTE works. **[4]**

OR

Q6) a) Write a short note on WWW & Internet. **[8]**

b) Explain Telnet with example. **[6]**

c) What is HTML? Explain it with any application. **[4]**

Q7) a) What is cryptography? Explain data encription std in detail. **[8]**

b) Explain cable tester. **[4]**

c) What is use of protocol Analyzer. **[4]**

OR

Q8) a) Explain in detail RSA Algorithm with example. **[8]**

b) How does Hash function works. **[4]**

c) Write a short note on network simulation. **[4]**

Total No. of Questions : 8]

SEAT No. :

P134

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[5871]-642
B.E. (Electronics)
PROCESS INSTRUMENTATION
(2015 Pattern) (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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) Define linear processes & non-linear processes. Explain linear process in detail. **[6]**

b) Sketch circuit diagram for OP-AMP implementation of P+I and PID controller. **[6]**

c) Compare P, P+I and PID controller modes. **[8]**

OR

Q2) a) Define dead time. Explain the concept of dead time with suitable example. **[6]**

b) Explain Ziegler Nichol's method of process loop tuning. **[6]**

c) Explain the concept of relay based tuning. State the advantages of relay based tuning. **[8]**

Q3) a) Explain ratio control scheme to maximize boiler combustion efficiency and minimize fuel use. **[8]**

b) Explain cascade control scheme with the help of suitable example. **[8]**

OR

Q4) a) Explain with neat block diagram adaptive control system. **[8]**

b) Explain selective control scheme to protect a process equipment. **[8]**

P.T.O.

Q5) a) Explain block diagram analysis of multivariable systems. **[9]**

b) Explain interaction between control loops in a typical multivariable system. **[8]**

OR

Q6) a) What is a batch process? Explain batch process control with respect to a batch mixing tank. **[9]**

b) Write short note on Relative Gain Analysis. **[8]**

Q7) a) Explain the hierarchy of control structure. **[9]**

b) Explain how plant performance is monitored in a typical process industry. **[8]**

OR

Q8) a) Explain safety layers employed to ensure safety in chemical process plants. **[9]**

b) Explain steps involved in defining the problem in process control design. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P969

[Total No. of Pages : 2

[5871]-643

B.E. (Electronics)

AUTOMOTIVE ELECTRONICS

(2015 Pattern) (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) ***Assume suitable data if necessary.***

Q1) a) State & Explain various types of Electronics systems in engine. **[8]**

b) Explain the phenomenon of knock in SI engine and Compare it with CI engine with suitable diagrams. **[8]**

c) Discuss in brief stages in ECU development. **[4]**

OR

Q2) a) What do you mean by engagement and disengagement of clutch when pulling away from standstill and gear change? **[8]**

b) Describe the construction of Indirect type tyre pressure monitoring system. **[8]**

c) Define the term air/fuel ratio. Also explain its effect performance of SI engine. **[4]**

Q3) a) Compare types of automotive buses based on any three criteria. **[6]**

b) Explain in brief about D2B and DSI communication protocol. **[6]**

c) Discuss flexible time triggered communication on CAN. **[4]**

OR

Q4) a) Explain the significance of Ethernet protocol in automotive systems? Explain the frame structure for the same. **[6]**

b) What do you mean by event driven and time driven communication. **[6]**

c) Explain open issues for automotive communication systems. **[4]**

P.T.O.

Q5) a) Explain steps involved for implementation of a model from MATLAB/ SIMULINK to Real-Time environment. **[6]**

b) Discuss the concept of steering control and rain operated wiper control. **[6]**

c) Write a note on transient operation of engines. **[4]**

OR

Q6) a) Explain any two control system strategies in fine tuning of automotive systems? **[6]**

b) Describe closed loop ignition control with suitable waveform. **[6]**

c) List guidelines for adopting model based development in automotive industry. **[4]**

Q7) a) What do you mean by multiplexed wiring? How it is implemented, explain with suitable diagram. **[6]**

b) Discuss possible faults when engine difficult to start when cold, engine starts then stop and when knock during acceleration. **[6]**

c) Explain with suitable diagram anti-collision warning system. **[6]**

OR

Q8) a) Describe the safety features in today's automotive cars. **[6]**

b) What are the applications of on-board diagnostics & off-board diagnostic? Explain operation cycles in on-board diagnostics. **[6]**

c) Explain how color of smoke from a diesel engine can be used as an aid to fault diagnosis. **[6]**

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

P970 **[Total No. of Pages : 3**

[5871]-644

B.E. (Electronics)

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 whenever necessary.***
3) ***Assume suitable data if necessary.***

Q1) List various environments for an agent. Compare between following environments. **[7]**

a) Fully observable versus partially observable

b) Deterministic versus stochastic

OR

Q2) Give types of Agent and Explain simple reflex agent with the help of a neat diagram. **[7]**

Q3) Explain simulated annealing algorithm in detail. Also explain how to select an annealing schedule. **[6]**

OR

Q4) Explain greedy best first search algorithm. **[6]**

Q5) Explain knowledge representation and knowledge-engineering process of the electronic circuit domain. **[7]**

OR

Q6) Explain the properties of Forward chaining and Backward Chaining and state the Differences between them? **[7]**

Q7) a) What is a Bayesian Belief Network and explain how it can be used for building models. **[12]**

b) How to represent OR Gate using linear classifiers. **[5]**

OR

Q8) Rohit installed a new burglary alarm at his home to detect burglary. The alarm reliably responds at detecting a burglary but also responds for minor earthquakes. Rohit has two neighbors Vinay and Sundar, who have taken a responsibility to inform Rohit at work when they hear the alarm. Vinay always calls Rohit when he hears the alarm, but sometimes he got confused with the phone ringing and calls at that time too. On the other hand, Sundar likes to listen to high music, so sometimes he misses to hear the alarm. Here we would like to compute the probability of Burglary Alarm.

Problem :

Calculate the probability that alarm has sounded, but there is neither a burglary, nor an earthquake occurred, and Vinay and Sundar both called the Vinay. **[17]**

Q9) a) Explain biological and artificial neural network. **[8]**

b) What is the difference between Forward propagation and Backward Propagation in Neural Networks? Explain. **[8]**

OR

Q10)a) Explain any four activation functions used in a neural network. **[8]**

b) Draw and explain perceptron algorithm for OR Logic Gate with 2-bit Binary input. **[8]**

Q11)a) Explain supervised and unsupervised learning with the help of example. **[9]**

b) What is use of clustering? Explain the methods to decide number of clusters in K means clustering. **[8]**

OR

Q12)a) What are Support Vectors in SVMs? What is the basic principle of a Support Vector Machine? What is use of Kernels in SVM ? **[9]**

b) Explain decision tree algorithm and state its advantages and limitations. **[8]**

Total No. of Questions : 8]

SEAT No. :

P135

[Total No. of Pages : 2

[5871]-645

B.E. (Electronics)

OPTICAL & MICROWAVE COMMUNICATION

(2015 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.***
2) ***Assume suitable data if necessary.***
3) ***Figures to the right indicate full marks.***

Q1) a) With neat block diagram explain optical fiber communication system and also list advantages of optical fiber communication system. **[8]**

b) Explain the following mechanisms associated with optical fiber communication. **[6]**

i) Scattering losses

ii) Absorbtion losses

c) With the neat energy level diagram. explain EDFA (Erbium Dopped Fiber Amplifier). **[6]**

OR

Q2) a) Write a short note on WDM couplers and explain its excess loss, insertion loss, coupling ratio and return loss. **[8]**

b) State and explain different types of optical fibers. **[6]**

c) Compare LED and LASER. **[6]**

Q3) a) Explain Microwave Directional coupler with neat schematic diagram and also write coupling ratio, Directivity and 'S' matrix. **[8]**

b) Explain Rectangular waveguide with plane wave reflected in a waveguide and also write properties of waveguides. **[8]**

OR

Q4) a) Explain the following types of waveguides, **[8]**

i) E-plane Tee ii) H-Plane Tee

iii) Magic Tee iv) Hybrid ring

P.T.O.

b) List advantages of Microwave explain two-Hole directional couplers. **[8]**

Q5) a) Draw and explain construction of Reflex klystron and also describe its working. **[8]**

b) Explain Gain-Bandwidth product limitations of conventional tubes. **[8]**

OR

Q6) a) With the neat schematic diagram, describe Linear Magnetron. **[8]**

b) A reflex klystron operates under the following conditions.

Vo = 600 v, L = 1mm, Rsh = 15 kΩ, fr = 9_{GHZ} $\frac{e}{m} = 1.759 \times 10^{11}$

(MKS System) The tube is oscillating at fr at the peak of the n = 2 mode or $\frac{3}{4}$ mode. Assume that the transit time through the gap and beam loading can be neglected.

Find :
- i) the value of the repeller voltage, Vr.
- ii) The direct current necessary to give a microwave gap voltage of 200v.
- iii) Electronic efficiency under this condition. **[8]**

Q7) a) Draw and explain physical structure of TRAPATT Diode and also explain its principle of operation. **[9]**

b) Describe principle of operation of Tunnel diode.
- i) Under zero bias equilibrium and
- ii) Under forward bias. **[9]**

OR

Q8) Write a short note on **[18]**
- a) Gunn Diode
- b) IMPATT Diode
- c) Varactor Diode

Total No. of Questions : 8]

SEAT No. :

P136

[Total No. of Pages : 2

[5871]-646

B.E. (Electronics)

Audio Video Engineering

(2015 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define following terms : **[6]**

i) Hue

ii) Saturation

iii) Brightness

b) Explain concept of 3D TV. **[6]**

c) Explain with block schematic operation of NTSC colour Receiver. **[8]**

OR

Q2) a) What is interlaced & progressive scanning. **[6]**

b) Explain sampling of video signal. **[6]**

c) What are the objectives of H.264. Explain its features. **[8]**

Q3) a) Explain Direct to Home services with block diagram. **[8]**

b) Explain video streaming in live program. **[8]**

OR

Q4) a) Draw block diagram of digital TV receiver giving the function of each block. **[8]**

b) Explain the principles & techniques used for video compression in MPEG-2 video compression format. **[8]**

P.T.O.

Q5) a) Explain different types of speakers. **[8]**

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

i) Acoustics of auditonum

ii) Studio acoustics

OR

Q6) a) Explain cordless microphone system state its advantages, disadvantages & applications. **[8]**

b) Draw block diagram of PA system & explain. **[8]**

Q7) a) Explain the play back process of compact disc with suitable diagram. Discuss different steps involved in the preparation of CDS. **[10]**

b) Compare Blue ray Disc & DVD. **[8]**

OR

Q8) Write short note on : **[18]**

a) Dolby digital sound system

b) MP3 player

c) DVD player

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Total No. of Questions : 8]

SEAT No. :

P137

[Total No. of Pages : 2

[5871]-647

B.E. (Electronics)

Testing and Verification for SoC Design

(2015 Pattern) (Semester - II) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 testing philosophy in detail. **[7]**

b) Explain Functional testing and compare it with Structural Testing. **[7]**

c) Design algorithm for True Value Simulation with example. **[6]**

OR

Q2) a) Discuss VLSI testing process and test equipment in details. **[7]**

b) Explain the different Fault Models in brief with suitable examples. **[7]**

c) Elaborate Statistical Methods for Fault Simulation in brief. **[6]**

Q3) a) Elaborate redundancy identification for combinational and sequential circuit. **[8]**

b) Explain combinational ATPG Algorithms for circuit test generation. **[9]**

OR

Q4) a) Explain different algorithm for Combinational Circuit test generation. **[8]**

b) Elaborate on “Simulation-Based Sequential Circuit ATPG”. **[9]**

Q5) a) Explain Add-hoc DFT methods for Scan design. **[8]**

b) What is the difference between ATPG and logic BIST? **[9]**

OR

P.T.O.

Q6) a) Explain partial Scan Design with suitable example. **[8]**

b) Explain variation of scan and its significance in detail. **[9]**

Q7) a) Describe the process of boundary scan test in detail. **[8]**

b) Explain system configuration steps with boundary scan. **[8]**

OR

Q8) a) Explain the motivation behind scanning Memory BIST. **[8]**

b) Give different Description languages for boundary scan. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P138

[Total No. of Pages : 2

[5871]-648
B.E. (Electronics)
ROBOTICS
(2015 Pattern) (Semester - II) (404212A) (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) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) Define Robot. With neat diagram describe basic structure of Robotics. **[5]**

b) Classify the sensors. Discuss the Factors to be considered for selection of sensor. **[5]**

OR

Q2) a) Explain classification of Robots. **[5]**

b) Explain any two sensors which are used in Robots. **[5]**

Q3) a) Define Gripper. List types of Grippers. With neat diagram explain vacuum type Gripper. **[5]**

b) List Robot drive systems. Draw and explain pneumatic actuator system. **[5]**

OR

Q4) a) List types of Electric actuators. With neat diagram explain construction of any one Electric Actuator. **[5]**

b) Differentiate between forward and inverse Kinematics of Robot. **[5]**

Q5) a) Explain following terms and explain importance of each term. **[8]**

i) Solvability

ii) Stiffness

iii) Singularities

b) What are the dynamics of systems of interacting rigid bodies? **[8]**

OR

P.T.O.

Q6) a) Explain following terms with respect to Robot. **[8]**

i) Kinematics

ii) Dynamics

iii) Control

iv) Trajectory planning

b) What are different parameters involved in Trajectory planning. Explain Trajectory planning for Flexible Robots. **[8]**

Q7) a) State different programming methods used in Robot programming. Explain in detail Lead through programming method. State advantages and disadvantages of lead through programming method. **[10]**

b) Explain steps to be taken in trajectory planning to avoid obstacles in path of Robot. **[8]**

OR

Q8) a) Draw and explain Robot Language structure. Explain different languages used for Robot programming. **[10]**

b) How skew line motion is different than straight line motion as far as path planning is concerned. **[8]**

Q9) a) Draw neat block diagram of Neural controller. Explain importance of each block and its working in detail. **[8]**

b) Explain with neat block diagram how vision system is used in complex control system. **[8]**

OR

Q10)a) With neat diagram explain in detail human robotic interaction. **[8]**

b) With suitable example explain the role of Fuzzy controller in robotics applications? **[8]**

Total No. of Questions : 8]

SEAT No. :

P139

[Total No. of Pages : 2

[5871]-649
B.E. (Electronics Engineering)
WIRELESS SENSOR NETWORKS
(2015 Pattern) (Semester - II) (Elective- IV) (404212B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Draw and explain architecture of Wireless Sensor Networks. **[6]**

b) Explain the centralized topology control and distributed topology control in wireless sensor Networks. **[6]**

c) List key features of Wibree protocol/standard. State advantages, disadvantages and applications of Wibree protocol/standard. **[8]**

OR

Q2) a) Draw the block diagram of Sensor Node (Mote) of WSN. Explain the hardware requirement for Sensor Node. **[6]**

b) Explain role of Medium Access Protocols (MAC). Explain metrics throughput and delay which decides the performance of Medium Access Protocols (MAC). **[6]**

c) Write short note on

i) Z-Wave Protocol

ii) ISA 100.11a protocol/standard **[8]**

Q3) a) What is localization in Wireless Sensor Networks? Explain types of location information in WSN. Explain localization precision and localization accuracy. **[8]**

b) What is routing in Wireless Sensor Networks? Explain full-network broadcast routing protocol with flow diagram. **[8]**

OR

P.T.O.

Q4) a) Draw and explain multi-hop Wireless Sensor Networks architecture. State the advantages and disadvantages of multi-hop Wireless Sensor Networks. **[8]**

b) Explain range-based localization and range-free localization in Wireless Sensor Networks. **[8]**

Q5) a) Explain the clustering techniques in Wireless Sensor Networks. Explain need of clustering in Wireless Sensor Networks. State the advantages of clustering in Wireless Sensor Networks. **[6]**

b) Explain defensive measures for attacks in physical layer and data link layer in WSN. **[6]**

c) Explain Statistical analysis in Wireless Sensor Networks. Explain compressive sampling in statistical analysis in Wireless Sensor Networks. **[6]**

OR

Q6) a) Explain nearest sink and geographic clustering technique in WSN. **[6]**

b) Explain physical layer, link layer and network layer attacks in WSN. **[6]**

c) Explain the different constraints regarding security issues in Wireless Sensor Networks. **[6]**

Q7) a) What is meant by deployment of Wireless Sensor Networks? Explain the general problems in Wireless Sensor Networks deployments. **[8]**

b) Explain the bottom-up implementation process of deployment of WSN. **[8]**

OR

Q8) a) Explain link/path problems and topology problems in deployments of Wireless Sensor Networks. **[8]**

b) Explain early WSN deployments in brief. Explain the Requirements Analysis in WSN. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P971

[Total No. of Pages : 2

[5871]-650

B.E. (Electronics Engg.)

RENEWABLE ENERGY SYSTEMS & DSM, (Elective - IV)

(2015 Pattern) (Semester - II) (404212C)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right side indicates full marks.***
3) ***Draw neat diagram wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Briefly write about different forms of energy. **[8]**

b) Explain spectral distribution of extra-terrestrial radiation and terrestrial Solar Radiation with schematics. **[6]**

c) Write a note on Biomass Resources and their Energy Potential. **[6]**

OR

Q2) a) Explain different types of photovoltaic cells. **[8]**

b) Explain installation of wind power plant with neat diagram. **[6]**

c) Define the biomass gasification. What are the different factor affecting Biogas Production. **[6]**

Q3) a) Explain in detail about the different techniques of DSM with necessary examples. **[10]**

b) Define DSM and explain the benefits of DSM. **[6]**

OR

Q4) a) Explain briefly about energy efficient equipments. **[6]**

b) Explain concept and features of DSM. **[6]**

c) What is load management? Explain its importance. **[4]**

P.T.O.

Q5) a) Classification of various Demand Response options in energy systems. **[8]**

b) Explain the energy management system. **[4]**

c) Explain the roll of communication infrastructure in energy system. **[4]**

OR

Q6) a) Explain the Demand Response strategies for various load categories. **[8]**

b) Explain Demand Response as an apart of smart grid initiative. **[8]**

Q7) a) Discuss understanding variation in demand and supply of electricity. **[8]**

b) Explain in details load forecasting. **[6]**

c) Discuss the need of energy audits. **[4]**

OR

Q8) a) Explain different types of audit and procedures to follow during energy audit. **[8]**

b) Discuss outcome of energy audit and energy saving potential. **[6]**

c) Explain the energy consumption in detail. **[4]**

Total No. of Questions : 8]

SEAT No. :

P972

[Total No. of Pages : 2

[5871]-651
B.E. (Electronics Engineering)
TM4C123GH6PM MICROCONTROLLER
(2015 Pattern) (Semester - II) (Elective - IV) (404212D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain in detail JTAG Debug Port of Cortex-M4F processor. **[6]**

b) Explain the processor mode and privileged levels for software execution in cortex-M4F processor. **[6]**

c) Explain different types of fault. Explain Hard Fault Status Register related to cortex-M4F processor. **[8]**

OR

Q2) a) Explain in detail Trace port Interface unit in Cortex M4F processor. **[6]**

b) With neat block diagram explain the programming model of Cortex-M4F processor. **[6]**

c) Explain in detail Exception types and Exception handlers in Cortex-M4F processor. **[8]**

Q3) a) Explain Floating-Point Unit (FPU) and control registers related to it in Cortex-M4F processor. **[8]**

b) Explain the following registers in Cortex-M4F processor. **[8]**

i) System control Block Register (SCB).

ii) Memory Protection Unit (MPU) Register.

OR

Q4) a) With the help of neat diagram explain Nested Vectored Interrupt Controller (NVIC) of Cortex-M4F processor. **[8]**

b) Explain in detail System Timer (SysTick) and System Timer Register. **[8]**

P.T.O.

Q5) a) Explain the following related to Cortex-M4F processor. **[6]**

i) Synchronous Serial Interface (SSI)

ii) Analog Comparator

b) With the help of neat diagram explain UART in Cortex-M4F processor. **[6]**

c) Explain in detail universal Serial Bus (USB) controller in Cortex-M4F processor. **[6]**

OR

Q6) a) Explain the following related to Cortex-M4F processor. **[6]**

i) Pulse Width Modulator (PWM)

ii) Quadrature Encoder Interface (QEI)

b) With the help of neat diagram explain controller Area Network (CAN) module. **[6]**

c) Explain in detail Inter-Integrated Circuit (I2C) InterFace. **[6]**

Q7) a) Explain with the help of block diagram application of electronic point-of-sale machines using TM4C123GH6PM Microcontroller. **[8]**

b) Explain with the help of block diagram how TM4C123GH6PM Microcontroller can be useful for HVAC and building Automation. **[8]**

OR

Q8) a) Explain with the help of block diagram application of factory Automation using TM4C123GH6PM Microcontroller. **[8]**

b) Explain with the help of block diagram Fire and security application of TM4C123GH6PM Microcontroller. **[8]**

Total No. of Questions : 8]

SEAT No. :

P140

[Total No. of Pages : 2

[5871]-654

B.E. (Electronics/Electronics & Telecommunications)

PROGRAMMABLE SYSTEM ON CHIP

(2015 Pattern) (Semester - II) (404192DC) (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) ***Figures to the right side indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***

Q1) a) Compare SoC & ASIC with suitable example. **[7]**

b) Explain the significance of RTL design flow for chip design. **[7]**

c) Explain clock domain crossing for crosstalk effect occurring in real time application of Wireless communication. **[6]**

OR

Q2) a) Describe compilation techniques required for SoC design. **[7]**

b) What is race in HDL simulation? Explain Combinational Read - Write race in detail. **[7]**

c) Discuss the effects of clocking parameters over SoC design? **[6]**

Q3) a) Explain Wet & Dry Etching for MEMS in detail. **[8]**

b) Discuss different types of Deposition processes and explain any one in detail. **[9]**

OR

Q4) a) Describe exotic processes in MEMS Design. **[8]**

b) Evaluate Lithography for MEMS Design. **[9]**

P.T.O.

Q5) a) Define different methods of synthesis for ASIC. **[8]**

b) Explain lithography method for FPGA design. **[9]**

OR

Q6) a) Explain synthesis and analysis for FPGA process. **[8]**

b) What is Lithography and explain best suitable lithography method for FPGA design. **[9]**

Q7) a) Draw a block diagram of Hardware Software Co-design. Explain each and every block. **[8]**

b) Discuss various design techniques of Integrated Circuits. **[8]**

OR

Q8) a) Draw a block diagram of Hardware Software Co-design. Explain in brief. **[8]**

b) Explain Memory Packaging for SoC in detail. **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P141

[Total No. of Pages : 2

[5871]-656

B.E. (Instrumentation and Control Engineering)

PROCESS DYNAMICS AND CONTROL

(2015 Pattern) (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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss objectives and benefits of process control in detail. **[7]**

b) Discuss polo zero effect on process response with suitable diagrams. **[7]**

c) Explain control performance measures in feedback control. **[8]**

OR

Q2) a) Explain single and multi-capacity process in detail. **[7]**

b) Describe the necessity of Process Modelling and degree of freedom. **[7]**

c) Derive closed loop stability condition for first order system with PI-controller. **[8]**

Q3) a) Write difference between SLPC and MLPC. **[8]**

b) Discuss ration control scheme with suitable example. **[8]**

OR

Q4) a) Explain feed forward control scheme with suitable example. **[8]**

b) Explain split range control scheme with suitable example. **[8]**

P.T.O.

Q5) a) Explain multivariable control with block diagram for two input two output system. Give any two examples multivariable systems. **[8]**

b) Explain design of static decoupler in detail for multivariable control. **[10]**

OR

Q6) a) Explain relative gain array method and its importance in multivariable control system in detail. **[8]**

b) Explain design of decentralized control for any suitable example. **[10]**

Q7) a) Explain model based controller design procedure using direct synthesis method. **[8]**

b) Explain model predictive control. **[8]**

OR

Q8) Write short note on

a) Model based controller **[8]**

b) Model predictive control. **[8]**

Total No. of Questions : 10]

SEAT No. :

P142

[Total No. of Pages : 2

[5871]-657
B.E. (Instrumentation & Control)
PROJECT ENGINEERING AND MANAGEMENT
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain different phases of project. **[5]**

b) Explain the role and responsibilities of the project manager. **[5]**

OR

Q2) a) What is project? Compare different types of projects. **[5]**

b) Explain the basic requirement of project scheduling. **[5]**

Q3) a) How will you choose the network (GERT, PERT, CPM) for different types of project? **[5]**

b) Explain the Vendor Pre-Qualification Evaluation process. **[5]**

OR

Q4) a) What is tendering? Explain different types of it. **[5]**

b) What is bidding. What are the documents required for bid evaluation. **[5]**

Q5) a) What is PFD? What is material balance sheet? Explain the contents of material balance sheet. **[8]**

b) Draw a P & I diagram of heat exchanger for steam temperature and pressure control. **[8]**

OR

P.T.O.

Q6) a) What are Instrument specification sheets? Write its significance. Which ISA standard is used to prepare it? **[8]**

b) What are the FEED documents? Explain Plant and piping layouts. **[8]**

Q7) a) Draw and explain the hookup diagram with suitable example. **[8]**

b) What are the various types of cables? Explain the selection criteria of it. **[8]**

OR

Q8) a) Explain any two ISA standards. **[8]**

b) Explain BOM and MBOM? **[8]**

Q9) a) What is Panel testing? Explain the panel testing procedure. **[9]**

b) What are the various activities performed during Installation and commissioning? Mention the documents required during these activities. **[9]**

OR

Q10)a) What are the CAT, FAT and SAT? Write the sample CAT for control panel. **[9]**

b) Write note on cold and hot commissioning. **[9]**

Total No. of Questions : 10]

SEAT No. :

P143

[Total No. of Pages : 2

[5871]-658

B.E. (Instrumentation & Control)

COMPUTER TECHNIQUES & APPLICATIONS

(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain long term scheduler with respect to process scheduling. **[5]**

b) Explain the working of linked file allocation method with neat diagrams. **[5]**

OR

Q2) a) What is internal fragmentation in memory management system? How it is minimized. **[5]**

b) Write short note on services of operating system. **[5]**

Q3) a) Write short note on virtual memory. **[5]**

b) Explain features & capabilities of TCP/IP. **[5]**

OR

Q4) a) Write short note on Industrial Ethernet. **[5]**

b) Write short note on Demand paging. **[5]**

Q5) a) Write short note data decryption. **[6]**

b) State the advantages & disadvantages of data parallelism. **[6]**

c) Explain different types of Real time operating system. **[6]**

OR

P.T.O.

Q6) a) Differentiate between Real time & embedded operating system. **[6]**

b) What is intertask dependency in parallel computers. **[6]**

c) Design a Huffman code for a source that puts out symbols a_1, a_2, a_3 & a_4 with their respective probabilities of occurrence as 0.1, 0.3, 0.2 & 0.4.**[6]**

Q7) a) Explain white box & black box testing. Discuss the advantages & limitations of each. **[8]**

b) Write short note on software maintenance. **[8]**

OR

Q8) a) What is software debugging? Explain any two debugging techniques.**[8]**

b) Write short note on validation testing? **[8]**

Q9) a) Explain the incremental model in software Development life cycle. **[8]**

b) Explain steps involved in software design. **[8]**

OR

Q10) a) Explain component based software analysis in detail. **[8]**

b) Write short note on Rapid development mode in software development life cycle. **[8]**

Total No. of Questions : 10]

SEAT No. :

P144

[Total No. of Pages : 2

[5871] - 659

B.E. (Instrumentation & Control)

INDUSTRIAL INTERNET OF THINGS

(2015 Pattern) (Semester - I) (Elective - I) (406264 A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic Pocket calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Discuss the challenges in IIOT. **[5]**

b) Explain Architecture of M2M network. **[5]**

OR

Q2) a) Explain gateway-mediated edge connectivity and management architecture pattern. **[5]**

b) Explain roll of platform in IOT. **[5]**

Q3) a) If IP address is 172.20.255.75 and subnet mask is 255.255.255.10 compute how many sub networks are present in network. **[5]**

b) Discuss deployment options of IOT platforms. **[5]**

OR

Q4) a) Explain layered data bus architecture pattern. **[5]**

b) Explain Device management in IOT. **[5]**

Q5) a) Explain user centric and local identity management. **[8]**

b) Explain data synchronization in IIOT. **[8]**

OR

Q6) a) Explain FOG computing in brief. **[8]**

b) Explain Identity lifecycle management. **[8]**

P.T.O.

Q7) a) Explain importance of privacy in IOT. **[8]**

b) Explain GAMBAS Adaptive Middleware. **[8]**

OR

Q8) a) Discuss security issues in smart city. **[8]**

b) Explain FP7 icore access framework. **[8]**

Q9) a) How IOT can be employed to maintain infrastructure of any industry. **[9]**

b) Explain big data and visualization in IOT. **[9]**

OR

Q10)a) Explain IOT in building management system. **[9]**

b) It is require to design a system to control some home appliances remotely, draw block diagram and explain various considerations and design in detail. **[9]**

▽▽▽▽

Total No. of Questions : 12]

SEAT No. :

P145

[Total No. of Pages : 2

[5871] - 660

B.E. (Instrumentation & Control)

ELECTRICAL DRIVES

(2015 Pattern) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Explain DC drive with block diagram. **[5]**

b) Discuss the functions of different parts of drive. **[5]**

OR

Q2) a) Discuss the functions of source, power modulator and sensing unit in drive. Give one example for each. **[5]**

b) Write a short note on need of drive in paper cutting application. **[5]**

Q3) a) Explain with diagram the Load-quadratal diagram of drive. **[5]**

b) Explain the concept of dynamics of motor with equation. **[5]**

OR

Q4) Derive the equation for moment of inertia in drives. **[10]**

Q5) Explain with block diagram the speed setpoint processing in 6RA70 drive. **[9]**

OR

Q6) Explain the steps for quick commissioning of 6RA70 drive. Give the parameter number for motor data insertion. **[9]**

P.T.O.

Q7) Write short note on :

a) Speed control methods for AC motor (Any 2) **[4]**

b) Speed and torque characteristics of DC motor. **[4]**

OR

Q8) List the quick commissioning parameters for configuring the drive to be operated in speed control via analog setpoint. **[8]**

Q9) a) Explain the construction and working of a VFD. Also list 5 manufacturers of VFD. Give at least one example of VFD. **[10]**

b) Write short note on speed and torque characteristics of induction motor. **[7]**

OR

Q10)a) Explain the procedure for interfacing a VFD to a induction motor. **[10]**

b) Explain the concept of servo drive. **[7]**

Q11)a) Explain the working of traction drive. **[8]**

b) Write short note on :

i) Kando system. **[4]**

ii) Speed time curve for train movement. **[4]**

OR

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

i) Solar powered drives.

ii) Battery operated drives.

b) Differentiate between AC and DC traction systems. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P2314

[Total No. of Pages : 2

[5871] - 661

B.E. (Instrumentation & Control)

ADVANCED DIGITAL SIGNAL PROCESSING

(2015 Pattern) (Semester - I) (Elective - I) (406264 C)

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) ***Use of Non- programmable Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) What are the disadvantages of Fourier Transform? **[5]**

b) Explain the Time- frequency analysis. **[5]**

OR

Q2) a) Why it is a need of multi-resolution analysis. **[5]**

b) Explain the time-frequency distribution. **[5]**

Q3) a) Explain the concept of up- sampling. **[5]**

b) Explain the concept of interpolation. **[5]**

OR

Q4) a) Explain the concept of down-sampling. **[5]**

b) Explain the concept of decimation. **[5]**

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

b) Differentiate between LMS algorithm and RMS algorithm with examples. **[8]**

OR

Q6) a) State and explain the properties of complex-spectrum. **[8]**

b) Explain in detail the homomorphic signal processing. **[8]**

P.T.O.

Q7) a) Explain the features and specifications of TMS320c67xx DSP processors. **[10]**

b) Distinguish between fixed and floating point DSP processor. **[6]**

OR

Q8) a) With neat diagram explain the architecture of DSP processor. **[8]**

b) Explain the features of external interfacing in DSP processor. **[8]**

Q9) a) With examples explain the Gabor Transform. **[10]**

b) Write a short note on Discrete Wavelet Transform. **[8]**

OR

Q10)a) Explain the Short Time Fourier Transform with examples. **[9]**

b) Differentiate between Continuous Wavelet Transform and Discrete Wavelet Transform. **[9]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P146

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[5871] - 662

B.E. (Instrumentation & Control)

ADVANCED BIOMEDICAL INSTRUMENTATION

(2015 Pattern) (Semester - I) (Elective - I) (406264 D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Explain the principle of short wave diathermy. **[6]**

b) Distinguish between External & implanted pacemakers. **[4]**

OR

Q2) a) Briefly discuss telemetry system used in medical field along with its applications. **[6]**

b) Why DC defibrillators are preferred than AC defibrillators? **[4]**

Q3) a) Specify the target material used in generation of X- ray? Give its technical reason for the used. Define hard and soft X-ray. **[6]**

b) Explain the principle of CT- scanning. **[4]**

OR

Q4) a) Discuss briefly the five pump heads in HLM. **[5]**

b) Explain the coulter type blood cell counter for RBC & WBC measurement. **[5]**

Q5) a) What are the different Display modes of Ultrasound? **[8]**

b) Which radionuclide imaging has capability to perform functional test. Explain the principle of the same imaging technique. Why NaI (Ti) is most popular in radionuclide imaging? **[8]**

OR

P.T.O.

Q6) a) What are the properties of Ultrasound? What are the materials used in ULTRASOUND TRANSDUCERS? **[8]**

b) What is nuclear medicine? What is single photon emission computed tomography? What is difference between SPECT and PET. **[8]**

Q7) a) Explain diabetic retinopathy treatment using laser. **[8]**

b) What is an Endoscopes? List different types of endoscopes used in biomedical field and their applications. **[8]**

OR

Q8) a) What are the various properties of laser. **[8]**

b) Explain thermal and non-thermal interaction of Laser with tissues. **[8]**

Q9) a) Describe wheels and Casters in wheel chair. **[10]**

b) Enlist various types of dialyzer? Explain KIIL Dialyzer with suitable diagram. Enlist the materials used for membrane in artificial kidney. **[8]**

OR

Q10)a) State any three materials used for wheelchair and specify their properties. **[10]**

b) What are the Precaution and SAFETY Considerations in HEMODIALYSIS? **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P147

[Total No. of Pages : 3

[5871] - 663

B.E. (Instrumentation & Control)

DIGITAL CONTROL SYSTEMS

(2015 Pattern) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2., Q.3. or Q.4., Q.5. or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams should be drawn wherever necessary.***
3) ***Use of Non- programmable Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) Find the stability of the system using Jury's test if the system is having characteristic equation as, **[10]**

a) $F(z) = z^3 - 1.3z^2 + 0.08z + 0.24 = 0$

b) $F(z) = z^4 - 1.368z^3 + 0.4z^2 + 0.008z + 0.024 = 0$

OR

Q2) a) Show that the transfer function of the zero order hold is equal to unity. **[8]**

b) Define: sampling rate. **[2]**

Q3) a) Derive the mathematical model for the discrete time control system. **[6]**

b) Explain the different building blocks of digital control system. **[4]**

OR

Q4) Explain the concept of ringing of poles? How ringing can be eliminated? **[10]**

Q5) a) Derive the equation for the solution of the state space. **[8]**

b) Find the state model for the given transfer function using direct programming. Draw the state diagram also. **[8]**

$$\frac{Y(z)}{R(z)} = \frac{z+2}{z^2+10z+25}$$

OR

P.T.O.

Q6) a) For a system with the state equation, **[8]**

$$\begin{bmatrix} x_1(k+1) \\ x_2(k+1) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -5 & -7 \end{bmatrix} \begin{bmatrix} x_1(k) \\ x_2(k) \end{bmatrix} \text{ and } x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

Find the state transition matrix.

b) For a system with the state equation, $x(k + 1) = Gx(k) + Hu(k)$ and $y(k) = cx(k)$, where **[8]**

$$G = \begin{bmatrix} 1 & 0 & 0 \\ -3 & 1 & 2 \\ 1 & 1 & 4 \end{bmatrix}, H = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \text{ and } C = \begin{bmatrix} 1 & 1 & 1 \end{bmatrix}$$

Find the pulse transfer function.

Q7) a) Explain the following terms : **[9]**

i) Full Order State Observer.

ii) Minimum Order State Observer.

iii) Reduced Order State Observer.

b) Find the state controllability, state observability and output controllability for the given system. **[9]**

$$\begin{aligned} x(k+1) &= \begin{bmatrix} 0 & 1 \\ 10 & 25 \end{bmatrix} x(k) + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(k) \\ y(k) &= \begin{bmatrix} 1 & 0 \end{bmatrix} x(k) \end{aligned}$$

OR

Q8) a) Explain the duality property of the controllability and observability. **[6]**

b) Find the state feedback gain matrix for the system, $x(k + 1) = Gx(k) + Hu(k)$ and $y(k) = cx(k)$, with **[12]**

$$G = \begin{bmatrix} 0 & 0 & -6 \\ 1 & 0 & -11 \\ 0 & 1 & -6 \end{bmatrix}, H = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \text{ and } C = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix}$$

the system is placed at the desired pole locations at, $-0.5 \pm j0.5, 2$

Q9) For a system with the state equation as, $x(k+1) = Gx(k) + Hu(k)$, determine the control sequence to minimize the given performance index. Also find J_{min} **[16]**

$$
\begin{aligned}
J &= \frac{1}{2}\left[x(0)\right]^2 + \frac{1}{2}\sum\left[x^2(k) + u^2(k)\right] \\
G &= 0.3679 \\
H &= 0.6321 \\
x(0) &= 1
\end{aligned}
$$

OR

Q10) For a system with the state equation as, $x(k+1) = Gx(k) + Hu(k)$, find the control sequenc, $u(k) = -Kx(k)$, such that to minimize the given performance index. **[16]**

$$
\begin{aligned}
J &= \sum_{k=0}^{3}\left[x^2(k) + u^2(k)\right] \\
G &= 0.3679 \\
H &= 0.6321
\end{aligned}
$$

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Total No. of Questions : 12]

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[5871]-664

B.E. (Instrumentation & Control)

SMART AND WIRELESS INSTRUMENTATION

(2015 Pattern) (Semester - I) (406265A) (Elective - II)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn whenever necessary.***
2) ***Figures to the right indicates full marks.***
3) ***Assume suitable data if necessary.***

Q1) Compare traditional networks and wireless sensor networks. **[6]**

OR

Q2) Comment on design constraints of wireless sensor networks. **[6]**

Q3) Elaborate with neat diagram Serial Peripheral Interface. **[6]**

OR

Q4) Write short note on XYZ node architecture. **[6]**

Q5) Explain source encoding in detail. **[8]**

OR

Q6) Explain pulse amplitude modulation. **[8]**

Q7) Car theft control system is to be design using WSN and Zigbee communication. Discuss the system based on following points.

a) Block Diagram. **[5]**

b) Sensor Selection. **[5]**

c) Detail explanation of the system. **[6]**

OR

P.T.O.

Q8) a) Explain quadratic amplitude modulation. **[8]**

b) Compare between Zig-bee and Bluetooth. **[8]**

Q9) a) What are different energy harvesting techniques? Explain any one in detail. **[8]**

b) Explain with neat diagram architecture of energy management in WSN. **[8]**

OR

Ql0) a) Draw neat block diagram system architecture of wireless node with energy Harvesters and discuss each block in detail. **[8]**

b) Write short notes on,

i) Thermal Energy Harvesting. **[4]**

ii) Criteria for battery selection. **[4]**

Q11)a) Explain motivation of structural health monitoring in detail. **[9]**

b) Analyze prototype of pipeline monitoring in detail. **[9]**

OR

Q12) a) Elaborate precision agriculture. **[9]**

b) Discuss in detail magnetic sensors of structural health monitoring. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

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[5871]-665

B.E. (Instrumentation & Control)

INSTRUMENTATION AND CONTROL FOR POWER PLANTS

(Elective - II) (2015 Pattern) (Semester - I) (406265B)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q.9 or Q.10.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figurs wherever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) Discuss building blocks of Thermal Power Plant. **[5]**

b) How Demineralization water treatment plant works in a thermal power Plant. **[5]**

OR

Q2) a) What is Coal and Ash handling system in Thermal Power Plants? **[5]**

b) Why boiler need drum level control? Elaborate it with diagram. **[5]**

Q3) a) Discuss the Instrumentation involved in Generator cooling systems. **[5]**

b) How will you reduce the thermal stress in turbine? **[5]**

OR

Q4) a) Explain fault tolerant system in thermal power plant. **[5]**

b) Explain the need of Electro-hydraulic governor system. **[5]**

Q5) a) What are the sources of radiation and how to protect from radiation? **[8]**

b) Explain the safety objectives of radiation. **[8]**

OR

P.T.O.

Q6) a) What is radioactive waste management? Explain. **[8]**

b) What safety measures are in place at a nuclear power plant? Explain it. **[8]**

Q7) a) Explain nuclear reactor control systems and allied instrumentation. **[8]**

b) Draw the P & I diagram of typical nuclear power plant. **[8]**

OR

Q8) a) Explain the spectrum analyses in detail. **[8]**

b) Discuss sensors used in nuclear power plant. **[8]**

OR

Q9) a) Discuss basic governor control system in hydro power plant. **[9]**

b) How does the water turbine control achieved in hydro power plant? Discuss its need. **[9]**

OR

Q10)a) How does the distributed control and SCADA system improve the reliability in Hydro power? **[9]**

b) What is energy management system in hydro power? Explain it. **[9]**

Total No. of Questions : 12]

SEAT No. : [ ]

P150

[Total No. of Pages : 2

[5871]-666

B.E. (Instrumentation & Control)

AUTOMOTIVE INSTRUMENTATION

(Elective - II) (2015 Pattern) (Semester - I) (406265C)

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

Instructions to the candidates:

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

Q1) Explain working of 4-stroke engine. **[6]**

OR

Q2) What are the different instruments in an electronic dashboard? **[6]**

Q3) What is ECU? And explain in detailed. **[8]**

OR

Q4) Write short note on contactless ignition control. **[8]**

Q5) Why is cranking position sensor required in automobiles? **[6]**

OR

Q6) Elaborate on engine oil pressure sensors. **[6]**

Q7) a) Draw and explain cruise control circuit. **[8]**

b) What is ABS in automobiles? Explain in brief. **[8]**

OR

P.T.O.

Q8) a) Differentiate between conventional and electronic braking systems. **[8]**

b) Explain in detailed electronic steering control in automobiles. **[8]**

Q9) a) What is antitheft control system in automobile? **[8]**

b) How is battery power controlled in automobiles? **[8]**

OR

Q10)a) Write a short note on battery monitoring in automobiles. **[8]**

b) Explain the various aspects of Reverse Park Assist System. **[8]**

Q11)a) What is ADAS? Elaborate in detailed. **[9]**

b) Differentiate between types of Electric vehicles. **[9]**

OR

Q12)a) What is the future of electric vehicles? **[9]**

b) Explain the charging systems used in electric vehicles. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

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B.E. (Instrumentation & Control)

OPTO - ELECTRONICS INSTRUMENTATION

(2015 Pattern) (Semester - I) (Elective - II) (406265D)

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 Total Internal Reflection in Fiber Cable. **[5]**

b) Write a note on Ray theory of transmission. **[5]**

OR

Q2) a) Classify the types of Optical fiber cable. **[5]**

b) Explain with neat sketch working of Optical current sensor. **[5]**

Q3) a) With neat sketch elaborate the steps of Manufacturing of optical fiber. **[5]**

b) An optical link is to be designed to operate over an 8-km length without repeater the rise time of the chosen components are : **[5]**

Source : 8 ns,

Fiber : Intermodal 15ns/km,

Intramodal : 1 ns/km,

Detector : 6ns,

From the system rise time considerations estimate the maximum bit rate that may be achieved on the link using NRZ code.

OR

Q4) a) Explain the Material and Bending losses in Fiber cable. **[5]**

b) Explain with diagram polarization modulated optical fiber sensor. **[5]**

Q5) a) List out the types of LASER. Explain with neat sketch Gas LASER. **[8]**

b) What is Holography: Explain the basic principle and applications of Holography. **[8]**

OR

Q6) a) Define. **[8]**

i) Q-Switching.

ii) Cavity Damping.

b) Explain working construction of LASER interferometry. **[8]**

P.T.O.

Q7) a) Explain in brief what are the Analog Arithmetic Operations in optics. **[8]**

b) Write a note on integrated optical devices: **[8]**

i) Switches.

ii) Modulator.

OR

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

i) Integrated Optics.

ii) Digital Optics.

b) What is Optical Amplifier? Explain the need of Optical Amplifier in optics. **[8]**

Q9) a) Explain with block diagram Optical Power Cable tester. **[9]**

b) Explain the Optical Computing concept w.r.t. to following points: **[9]**

i) Concept.

ii) Gates.

iii) Switch.

OR

Q10)a) Explain with block diagram working principal of Fiber Optical Numerical Aperture Measurement. **[9]**

b) Explain with block diagram Optical Time Domain Refractrometer (OTDR). **[9]**

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Total No. of Questions : 12]

SEAT No. :

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[Total No. of Pages : 2

[5871]-668
B.E. (Instrumentation & Control)
SOFT COMPUTING
(2015 Pattern) (Semester - I) (Elective - II) (406265E)

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

Instructions to the candidates :

1) ***Attempt Q.No.1 or 2, Q.No.3 or 4, Q.No.5 or 6, Q.No.7 or 8, Q.No.9 or 10, Q.No.11 or 12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is difference between single layer and multilayer feed forward networks? **[5]**

b) What are the various learning techniques? **[5]**

OR

Q2) a) What are recurrent networks? Explain with example. **[5]**

b) Explain Auto-associative memory and its usage. **[5]**

Q3) a) What are back propagation learning methods? **[5]**

b) Elaborate on multilayer perception model. **[5]**

OR

Q4) a) What are the factors affecting back propagation training? **[5]**

b) Explain perception model with example. **[5]**

Q5) a) Differentiate between Fuzzy sets and Crisp sets. **[6]**

b) What is fuzzy logic? Explain with application. **[6]**

OR

Q6) a) What are the properties of fuzzy sets? **[6]**

b) Explain with application fuzzy set operations. **[6]**

P.T.O.

Q7) a) Elaborate on membership functions of fuzzy logic. **[7]**

b) Write a short note on industrial application of fuzzy logic. **[6]**

OR

Q8) a) Draw and explain fuzzy controller. **[7]**

b) What are differences between Fuzzyfications and Defuzzifications? **[6]**

Q9) a) Explain use of fuzzy sets in fuzzy controller. **[6]**

b) What are the static properties of fuzzy controller? **[6]**

OR

Q10)a) What are the dynamic properties of fuzzy controller? **[6]**

b) Draw and explain basic construction of fuzzy controller. **[6]**

Q11)a) Distinguish between Fuzzified CMAC and RBF network based self-learning controllers. **[6]**

b) Explain unified approximate reasoning approach. **[5]**

c) What are Neuro Fuzzy systems? **[2]**

OR

Q12)a) What are self-learning controllers? Give an example. **[7]**

b) Elaborate on Fuzzified CMAC self-learning controllers. **[6]**

Total No. of Questions : 10]

SEAT No. :

P152

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[5871]-669

B.E. (Instrumentation & Control)

PROCESS INSTRUMENTATION

(2015 Pattern) (Semester - II) (406268)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***
5) ***Use of calculator is allowed.***

Q1) a) Develop override control strategy to protect heat exchanger. **[6]**

b) Identify safety interlocks for boiler from safety point of view. **[4]**

OR

Q2) a) Develop feedback control strategy for distillation column level control. **[6]**

b) Determine DOF for steam heater. **[4]**

Q3) a) Develop burner management system for air and fuel ratio control in Boiler. **[6]**

b) Identify the process variables in Distillation column. Enlist control variables and select appropriate manipulated variables for their control. **[4]**

OR

Q4) a) Develop inferential control strategy for composition control of distillation column. **[6]**

b) Comment on shrink and swell effect in boilers. **[4]**

Q5) a) Identify process variables, control variables (C.V.) and manipulated variables (M.V.) and perform pairing of C.V and M.V. based on control objectives of Dryers. **[6]**

b) Design selective control strategy for multi effect evaporators. **[10]**

OR

P.T.O.

Q6) a) Develop cascade control strategy for density control of products in multi-effect evaporators. **[8]**

b) Develop feedback control strategy for composition control of product in dryers. **[8]**

Q7) a) Develop ratio control strategy to maintain reactants for Endothermic reactor. **[10]**

b) Explain in brief batch recipe management. **[8]**

OR

Q8) a) Develop temperature on flow cascade control strategy for exothermic reactors. **[10]**

b) Develop End point detection control for batch reactors. **[8]**

Q9) a) Develop override control for safety of compressors. **[8]**

b) Develop on-off level control for dual pump station. **[8]**

OR

Q10) a) What do you mean by surge in compressors? **[6]**

b) Develop anti-surge control strategy for compressors. **[10]**

Total No. of Questions : 10]

SEAT No. :

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[5871]-670
B.E. (Instrumentation & Control)
INDUSTRIAL AUTOMATION
(2015 Pattern) (Semester - II)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Use of non-programmable scientific calculator is allowed.***

Q1) a) Explain the role of automation in industries. What are the benefits of automation. **[5]**

b) Explain control system & automation strategy. **[5]**

OR

Q2) a) Compare control net with industrial Ethernet. **[5]**

b) Explain HART protocol. **[5]**

Q3) a) Draw & explain architecture of PLC. **[5]**

b) What is the role of PLC in DCS with example. **[5]**

OR

Q4) a) List various commands used in HART. **[5]**

b) Explain RS 232 & RS 485 in brief. **[5]**

Q5) a) Explain about SCADA with its limitation, advantages & disadvantages in process industries. **[8]**

b) What are the functions of SCADA & explain any one function with suitable example. **[8]**

OR

P.T.O.

Q6) a) What is the objective of SCADA & its effect on process industries. **[8]**

b) Why SCADA is used in process? Does SCADA allow you the total control of process? Explain it. **[8]**

Q7) a) Explain the architecture of DCS. **[8]**

b) Write detail specifications of DCS. **[8]**

OR

Q8) a) Explain supervisory computer functions. **[8]**

b) Explain communication module of DCS. **[8]**

Q9) a) How will you achieve the process safety? Explain it. **[9]**

b) Explain safety interlocks of safety management system. **[9]**

Q10)a) Explain Hazard & operability study (Hazop). **[9]**

b) Explain Safety Integrity Level (SIL) **[9]**

Total No. of Questions : 10]

SEAT No. : [ ]

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B.E. (Instrumentation and Control)

Building Automation

(2015 Pattern) (Elective -III) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Compare BACnet protocol with LON Works. **[5]**

b) Compare VAV with CAV. **[5]**

OR

Q2) a) Which are the comfort parameters for human being? Justify each one? **[5]**

b) What is M-Bus? Give its application. **[5]**

Q3) a) Compare air filtration techniques such as Ozonisation and UV. **[5]**

b) Draw the architecture of IBMS and describe it. **[5]**

OR

Q4) a) Draw simplified diagram of AHU and describe various measurements. **[5]**

b) Compare AHUs based on 100% outdoor air and mixed air type. **[5]**

Q5) a) Describe vapor compression cycle in detail with neat diagram. **[8]**

b) Compare air cooled and water-cooled chillers. **[8]**

OR

Q6) a) Illustrate mechanical or forced draught cooling tower. **[8]**

b) Compare water tube and fire tube boilers used in hot water systems. **[8]**

P.T.O.

Q7) a) Compare class A and class B wiring in fire alarm system. **[8]**

b) Compare conventional and addressable fire alarm systems. **[10]**

OR

Q8) a) Which are different detector used in FAS? Explain in details. **[8]**

b) What is IDCs, NACs and SLCs? Describe in details. **[10]**

Q9) a) What is ACS? Describe its benefits. **[8]**

b) Describe credential, credential reader. Also explain the concept of physical and logical access. **[8]**

OR

Q10) a) Explain architecture of CCTV system with components. **[8]**

b) Draw and explain the detailed architecture of ACS. **[8]**

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Total No. of Questions : 12]

SEAT No. :

P155

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[5871]-672

B.E. (Instrumentation and Control)

Robotics and Automation

(2015 Pattern) (Elective - III) (Semester - II)

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, Q. No. 11 or Q. No. 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) Differentiate between automation and robotics. **[6]**

OR

Q2) Differentiate among fixed automation, programmable automation and flexible automation. **[6]**

Q3) What are three laws formulated by Issac Asimov? Comment on them. **[8]**

OR

Q4) Classify robots according to configurations. Give at least one merit and one demerit of each. **[8]**

Q5) Explain the various steps in machine vision. How is machine vision implemented in robotics? **[6]**

OR

Q6) Write an application on kinematic transformations. **[6]**

Q7) a) Enlist methods of robot programming. Explain lead through method in detailed. **[8]**

b) Explain the concept of branching and move safe in robot programming. **[8]**

OR

P.T.O.

Q8) a) Explain the capability and limitations of lead through programming method. **[8]**

b) Explain the use of wait, signal and delay commands with examples. **[8]**

Q9) a) Differentiate between robot and autonomous robot. **[8]**

b) Explain the concept of mobility, locomotion and navigation in autonomous robots. **[8]**

OR

Q10) a) Explain how the navigation, path planning and obstacle avoidance is achieved in autonomous robots? **[8]**

b) Explain with diagram the control scheme used in autonomous robots with path planning and motion control. **[8]**

Q11) a) Explain how robots are used for assembly application and automatic inspection. **[9]**

b) Explain robotic application in arc and spot welding. What are the merits and demerits compared to classical methods. **[9]**

OR

Q12) a) Explain the concept and application of compliance and Remote Centre Compliance (RCC)? **[9]**

b) Explain with neat diagram how robots are used in spray coating and other processing operations. What are its merits over conventional methods? **[9]**

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Total No. of Questions : 8]

SEAT No. :

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[5871]-673

B.E. (Instrumentation & Control Engineering)

ENVIRONMENTAL INSTRUMENTATION (Elective - III)

(2015 Pattern) (Semester - II) (406270C)

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

Q1) a) List out the sensors requirement for Environment, explain any one with diagram. **[6]**

b) Illustrate the requirement of water treatment facilities and the process design. **[7]**

c) What is Instrumentation in ground water monitoring? Illustrate the laboratory analysis of ground water samples? **[7]**

OR

Q2) a) Explain the process of Photo-Ionization with illustrated diagram. **[6]**

b) List out the Water quality parameters? Explain in details the Opacity monitors. **[7]**

c) Illustrate laboratory analysis of ground water samples along with it define the Ground water monitoring. **[7]**

Q3) a) Define what are Waste Water and Flow Monitoring System? Also describe the Automatic waste water sampling with diagram. **[8]**

b) What are the latest methods of waste water treatment plants? Differentiate between Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) along with the applications. **[8]**

OR

P.T.O.

Q4) a) List out the methods of Rain water harvesting in brief? Explain in detail its role in NGOs & municipal corporation. **[8]**

b) Define and describe the Flow monitoring system? Also differentiate between the Non open channel flow measurement and open channel waste water flow measurement. **[8]**

Q5) a) Define and describe the Air Pollution and Sound Monitoring Systems and energy environment relationship. **[9]**

b) Describe the Air sampling methods & equipments with proper diagram. **[9]**

OR

Q6) a) How can we have the Control of air pollution? Describe the analytical methods for air pollution studies? **[9]**

b) Define the basics of sound pollution? Explain the Acoustic noise measurement & monitoring. **[9]**

Q7) a) List out the Instruments in Weather station? Explain the Barometer in details. **[8]**

b) Describe the Global environmental analysis with example. **[8]**

OR

Q8) a) List out the Instruments in Weather station? Explain the Rain gauge in details. **[8]**

b) Explain the Virtual Instruments in Environmental Engineering Laboratory in brief. **[8]**

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Total No. of Questions : 10]

SEAT No. :

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[Total No. of Pages : 2

[5871]-674

B.E. (Instrumentation & Control)

DIGITAL IMAGE PROCESSING

(2015 Pattern) (Elective - III) (Semester - II) (406270D)

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 should be drawn wherever necessary.***
3) ***Use of Non-programmable Calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) What is image enhancement? **[5]**

b) Explain linear and nonlinear stretching. **[5]**

OR

Q2) a) What is histogram? **[2]**

b) Perform histogram equalization of the following Image. **[8]**

Grey Level	0	1	2	3	4	5	6	7
No of Pixel	40	48	84	100	146	96	200	310

Q3) a) Explain the relation between pixels **[5]**

i) 4 connectivity.

ii) 8 connectivity.

iii) Mixed connectivity.

b) Explain RGB color Model. **[5]**

OR

Q4) a) Explain sampling and Quantization in Image processing. **[5]**

b) Explain Image model. **[5]**

Q5) a) Explain image pattern and pattern classes. **[9]**

b) Explain the need of classifiers in image processing. Draw the flow using any application. **[9]**

P.T.O.

OR

Q6) a) How the image is represented. Explain the methods in detail. **[9]**

b) Explain the role of image descriptors in image processing. **[9]**

Q7) a) Write a short note on Vector Quantization. **[8]**

b) Explain the arithmetic coding for image processing. **[8]**

OR

Q8) a) Explain the RLE compression technique. **[8]**

b) Explain the properties in image compression schemes. **[8]**

Q9) a) Explain the role of image processing in biometrics. **[8]**

b) How image processing is used in military application. **[8]**

OR

Q10) a) Explain the application in image processing in agriculture field. **[8]**

b) Write a short note on application of image processing in bio-medical engineering. **[8]**

Total No. of Questions : 10]

SEAT No. :

P2301

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[5871]-675
B.E. (Instrumentation & Control)
PROCESS MODELLING AND OPTIMISATION
(2015 Pattern) (Elective - III) (Semester - II) (406270E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic tables, slide rule, Mollier charts, electronic.***
5) ***Pocket calculator and steam tables is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) How process model can be developed in frequency domain. **[10]**

OR

Q2) A For a experimentation following data is obtain **[10]**

X	0	10	20	30	40	50	60	70	80	90	100
Y	100	103	107	112	117	121	124	128	133	137	139

Identify the curve fitting equation will give best fit. Obtain the values coefficient of equation.

Q3) Obtain mathematical representation of two isothermal tanks having constant holdups series converting reactant A and B into two product C with reaction rate k and reaction is endothermic. **[10]**

OR

Q4) Explain merits and demerits of step and sine wave testing. **[10]**

Q5) a) Determine the stability of a 2 × 2 process with a diagonal feedback controller given as : **[9]**

$$G_m = \begin{bmatrix} 5 & 3 \\ 2 & 4 \end{bmatrix} \text{ and } B\_s = \begin{bmatrix} 4 & 1 \\ -1 & 5 \end{bmatrix}$$

b) Explain relative gain array. **[9]**

P.T.O.

OR

Q6) a) Explain Inverse Nyquist Array and it's application in analysis of multivariable system. **[9]**

b) For the system given Find NI for this comment on stability also find proper paring of control and manipulated variables **[9]**

$$\begin{bmatrix} X \\ Y \end{bmatrix} = \begin{bmatrix} 10\dfrac{e^{-2s}}{(2s+1)} & 15\dfrac{e^{-s}}{(5s+1)} \\ 6\dfrac{e^{-5s}}{(5s+1)} & \dfrac{e^{-2s}}{(2s+1)} \end{bmatrix} \begin{bmatrix} P \\ Q \end{bmatrix}$$

Q7) a) What is objective functions and explain various constraints? **[8]**

b) Explain optimization component of optimization statement with suitable example. **[8]**

OR

Q8) a) Explain Convex and Concave functions with proper example and it's roll in optimization. **[8]**

b) Explain Extremum of the objective functions, quadratic approximation. **[8]**

Q9) a) Determine the optimum values of x_1 & x_2 for the function **[8]**

$$y = \frac{x_1^2}{4} + \frac{6}{x_1 x_2} + 3x_2$$

and state whether point is minimum or maximum

b) Explain Quasi Newton method for optimization. **[8]**

Q10)a) Explain region elimination method. **[8]**

b) Explain simplex method of optimization. **[8]**

Total No. of Questions : 12]

SEAT No. : ____

P2312

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[5871] - 676

B.E. (Instrumentation & Control)

RELIABILITY ENGINEERING

(2015 Pattern) (Semester - II) (Elective - IV) (406271 A)

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

Instructions to the candidates :

1) ***Attempt Q. No.1 or 2, Q. No.3 or 4, Q. No.5 or 6, Q. No.7or 8, Q. No.9 or 10, Q. No.11 or 12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Explain the Multi Component Reliability Evaluation. **[5]**

b) Elaborate on Approximate System Reliability Evaluation. **[5]**

OR

Q2) a) What is the use of basic probability theory? **[5]**

b) What is Time Dependent Probability? Explain with example. **[5]**

Q3) a) What is difference between Baye's testing and Testing Hypotheses? **[5]**

b) Elaborate on Probability Distribution Functions with example. **[5]**

OR

Q4) a) Write short on interval estimation with application. **[5]**

b) Explain Reliability Life Testing Methods with example. **[5]**

Q5) a) What is the use of Acceptance Sampling? Give example. **[6]**

b) What is Total Quality Management? Explain with application. **[6]**

OR

Q6) a) What is Control Charts? Give example. **[6]**

b) Explain with application tools and techniques for TQM. **[6]**

P.T.O.

Q7) a) What is Software Testing? Give example. **[7]**

b) Explain with example what is reliability? **[6]**

OR

Q8) a) Explain Software Metrics for Reliability Assessment. **[7]**

b) What is Software Reliability Concepts? **[6]**

Q9) a) What is difference between Product Liability and Planning? **[6]**

b) Elaborate on Fault Tree Analysis (FTA) with example. **[6]**

OR

Q10)a) Explain with example what is Product Development Process? **[6]**

b) Write a short note on Failure Mode and Effect Analysis (FMEA). **[6]**

Q11)a) Differentiate on inherent, achieved and operational availability. **[6]**

b) What are objectives of maintenance? **[5]**

c) What is system down time? **[2]**

OR

Q12)a) What are types of Standards for Reliability. **[7]**

b) What is Costs of Unreliability? **[6]**

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Total No. of Questions : 10]

SEAT No. :

P973

[Total No. of Pages : 2

[5871]-677
B.E. (Instrumentation & Control)
RENEWABLE ENERGY SYSTEMS
(2015 Pattern) (Semester - II) (Elective - IV)

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

Q1) a) Elaborate on the working of Tidal renewable system with diagram. **[6]**

b) Compare solar and wind Renewable energy system. **[4]**

OR

Q2) a) Explain the working of Solar photo voltaic Panel with diagram. **[6]**

b) List the various parameters of battery. Define the following terms related to the battery: Depth of Discharge. Life cycle. **[4]**

Q3) a) Draw and explain the working of Rechargeable battery. **[6]**

b) Define the following terms related to photo voltaic cell **[4]**

i) Current at maximum power point

ii) Voltage at maximum power point. Draw I - V curve of Solar cell

OR

Q4) a) Explain the working of Fly wheels with neat diagram. **[6]**

b) State the specification & selection criteria of Pb-Acid battery. **[4]**

Q5) a) List the components of Solar Tracker? What are the advantages of Solar Tracker? Elaborate on the working of Solar Tracking with neat diagram. **[10]**

b) Draw and explain the working of MPPT Algorithm. **[8]**

OR

P.T.O.

Q6) a) Compare Isolated and Non Isolated Solar Photo voltaic system. Explain the working of Isolated Solar photo voltaic system with neat diagram. **[10]**

b) State the role of Power Converters in Solar Photo voltaic system. Explain the working of Power converters in solar photo voltaic system with neat diagram. **[8]**

Q7) a) Draw and explain the working of solar power generation plant with neat diagram. **[8]**

b) Explain the working of Solar Street lap with neat diagram. **[8]**

OR

Q8) a) With the help of block diagram. Explain the working of Solar Electric vehicles. **[8]**

b) Draw and explain the working of Solar roof top Photovoltaic Electrical energy system. **[8]**

Q9) a) Explain the wind energy site selection technique. **[8]**

b) Elaborate on the wind resource Assessment. **[8]**

OR

Q10)a) Draw and explain the working of wind plus conventional grid energy system. **[8]**

b) Elaborate on the concept of Wind farm with block/neat diagram. **[8]**

Total No. of Questions : 10]

SEAT No. :

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[Total No. of Pages : 2

[5871]-678

B.E. (Instrumentation and Control)

INSTRUMENTATION IN AGRICULTURE AND FOOD INDUSTRIES

(2015 Pattern) (Semester - II) (Elective - IV)(406271C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) It is proposed to measure humidity, suggest suitable sensors. Elaborate working of dry bulb and wet bulb type Hygrometer. **[5]**

b) Draw a neat diagram and illustrate operation of Hair Hygrometer. **[5]**

OR

Q2) a) Develop a flow diagram for the typical dairy plant. List important components used in dairy industry. **[5]**

b) Develop process flow diagram for Juice extraction plant. **[5]**

Q3) a) It is proposed to monitor agro metrological parameters at weather station. Suggest suitable sensors. Develop block diagram of the system and elaborate its operation. **[5]**

b) Compare Overhead and Micro Irrigation methods. **[5]**

OR

Q4) a) What are selection criteria of pumps in agriculture and also explain types of Pumps available. **[5]**

b) Draw and Explain Ventilation in Green house environment. **[5]**

P.T.O.

Q5) a) Explain implementation of Hydraulic Control system. **[8]**

b) It is proposed to monitor Agro metrological parameters at weather station. Suggest suitable sensors. Develop a block diagram of the system and elaborate its operation. **[8]**

OR

Q6) a) Enlist basic components of hydraulic system. Explain with suitable diagram, operation of hydraulic system used for tractor. **[8]**

b) Elaborate well type and matching type characteristics of pumps. **[8]**

Q7) a) Elaborate in brief Food Quality measurement. **[8]**

b) Illustrate the concept of AGMARK. Differentiate between FSSAI and AGMARK. **[10]**

OR

Q8) a) Write a short note on need food safety standards. **[8]**

b) Define the recommended International code of hygiene for various products in food processing. **[10]**

Q9) a) Construct the ladder diagram for PLC application in packaging industry. Assume suitable data for conveyor control. Also draw the diagram for above system. **[8]**

b) Analyze Equipments for creating and maintaining controlled atmosphere. **[8]**

OR

Q10)a) It is proposed to sort apples according to size and color. Suggest the suitable sensors used for the system. Develop the block diagram and elaborate the operation. **[8]**

b) Elaborate Trends in Modern Food Processing. **[8]**

Total No. of Questions : 10]

SEAT No. :

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B.E. (Instrumentation and Control)

SMART MATERIAL & SYSTEMS

(2015 Pattern) (Semester - II) (Elective - IV) (406271 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) ***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 properties of piezoelectric material used for generation of ultrasonic waves. **[4]**

b) Explain Electrostrictive elastomers in detail. **[6]**

OR

Q2) a) Does smart material respond environmental changes? Elaborate. Mention five smart materials. **[5]**

b) Write applications of shape memory ceramics. **[5]**

Q3) a) What are SWCNT & MWCNT. compare. **[4]**

b) What is Self-Healing material. Discuss with example & applications. **[6]**

OR

Q4) a) Enlist applications areas of CNT. **[5]**

b) Explain the concept of Electrostatic comb drive. **[5]**

Q5) a) What are MEMS. Enlist advantages & applications MEMS. **[10]**

b) Explain the Microsystems at radio frequencies & its applications. **[8]**

OR

P.T.O.

Q6) a) Compare among MEMS and conventional systems. Explain Piezoelectric inkjet print head. **[10]**

b) Explain magnetic micro relay systems. **[8]**

Q7) a) Explain Chemical vapor deposition process with neat diagram. **[8]**

b) Explain lithography in detail. **[8]**

OR

Q8) a) Explain the Diffusion and Ion implantation process of dopants. **[8]**

b) Explain surface machining in detail. **[8]**

Q9) a) Explain the concept of Lab on chip technology in detail. Discuss the components of lab on chip device. **[8]**

b) Discuss one automotive application of smart sensors in detail. **[8]**

OR

Q10)a) Explain bulk machining in detail. **[8]**

b) Discuss detail application of lab on chip in research. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 2

[5871]-680
B.E. (Chemical)
PROCESS DYNAMICS AND CONTROL
(2015 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, 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, Molllier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Derive transfer function of single tank liquid level system and obtain time-domain for the process if input is given a step change. **[5]**

b) What are the types of inputs? Describe all of them graphically. **[5]**

OR

Q2) a) Derive transfer function for two tank non interacting liquid level system. **[5]**

b) Define characteristics of under damped system with neat diagram. **[5]**

Q3) a) Using Routh-Hurwitz criteria check the stability of a system described by equation. **[7]**

$s^4+s^3+s^2+4s+2 = 0$

b) Discuss Characteristic equation for control system **[3]**

OR

Q4) Sketch the root locus for the following transfer function **[10]**

$$G(s) = \frac{K}{(s+1)(S+2)(s+3)}$$

P.T.O.

Q5) a) Sketch the Bode diagram for PD controller. **[10]**

b) Explain Ziegler Nicholes Tuning technique. **[8]**

OR

Q6) a) A unity feedback control system has. **[12]**

$$G(s)=\frac{80}{s(s+2)(s+20)}$$

Draw the Bode plot, Determine G.M. & P.M. comment on the stability.

b) Explain Nyquist stability criteria. **[6]**

Q7) a) Explain cascade control system for CSTR. **[10]**

b) Explain split range control system. **[6]**

OR

Q8) a) Explain ratio control system. **[10]**

b) Explain relative Advantages and Disadvantages of Feedforward and Feedback control. **[6]**

Q9) Explain with Objectives, Functions, Role in process control, Applications. **[16]**

i) PLC and SCADA.

ii) DCS.

iii) Role of digital computers in controller.

iv) Supervisory control.

OR

Q10)a) Draw an instrumentation diagram and discuss all the detail and working of Distillation column control. **[8]**

b) Explain the role of digital computers in process control. **[8]**

Total No. of Questions : 10]

SEAT No. :

P161

[Total No. of Pages : 2

[5871]-681
B.E. (Chemical)
CHEMICAL REACTION ENGINEERING - II
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) Derive the equation for stokes regime in case of gas film control rate of spherical shrinking particles. **[10]**

OR

Q2) Derive an equation for calculation of tower height for fast reaction when straight mass transfer without reaction takes place. **[10]**

Q3) a) Explain mercury penetration method for determination of catalyst pore size. **[5]**

b) Explain the characteristics of the catalyst. **[5]**

OR

Q4) Derive the BET equation for determination of surface area of catalyst. **[10]**

Q5) a) Derive the expression for effectiveness factor of single cylindrical pore of the catalyst. **[10]**

b) Describe significance of pore diffusion resistance? **[6]**

OR

P.T.O.

Q6) a) Explain Thiele modulus and give the significance of the Thiele modulus. **[8]**

b) Explain the selectivity for a porous catalyst in parallel and series catalytic reaction. **[8]**

Q7) a) Discuss the experimental method for finding rates in case of mixed and recycles reactors. **[8]**

b) Derive the expression for design equation for mixed flow reactor containing porous catalyst. **[8]**

OR

Q8) The following mechanism has been proposed for a catalytic reaction.

$$A_{(g)} + B_{(g)} \rightarrow C_{(g)}$$

(1) $A_{(g)} + X == AX$ (2) $AX + B_{(g)} == CX$ (3) $CX + C_{(g)} == X$

Where, X indicates an active site on the catalyst. Derive an expression for the rate of reaction if the surface reaction step is a rate controlling. **[16]**

Q9) a) Explain Michaelis-Menton Kinetics with its model parameters. **[9]**

b) Give the design of slurry reactor. **[9]**

OR

Q10)a) Give the design of fixed bed reactor. **[9]**

b) Explain the inhibition in the enzyme catalyzed reaction with foreign substrate. **[9]**

Total No. of Questions : 10]

SEAT No. : ____

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[Total No. of Pages : 3

[5871]-682

B.E. (Chemical Engineering)

CHEMICAL ENGINEERING DESIGN - II

(2015 Pattern) (Semester - I) (409343)

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 design variables in distillation. **[4]**

b) Calculate the plate efficiency for the plate design using Van Winkle's correlation. **[6]**

Liquid Density : 925 kg/m^3,

Vapour Density : 1.35 kg/m^3,

Liquid Viscosity : 0.34×10^{-3} Ns/m^2,

Vapour Viscosity : 10.0×10^{-6} Ns/m^2,

Diffusivity of Light Key : 4.64×10^{-9} m^2/s,

H_w : 50 mm,

FA (fractional area) : A_h/A_c : = 0.076

Superficial vapour velocity = 0.81/0.50 = 1.62 m/s,

Surface Tension = 60×10^{-3} N/m

OR

Q2) a) Describe the total plate pressure drop in the plate column for distillation. **[6]**

b) Define the following terms with reference to sieve plate column with significance; **[4]**

i) Weeping Point

ii) Fractional Entrainment

P.T.O.

Q3) Find the column diameter of a packed absorption column operating at 20°C and atmospheric pressure. If (m G_m/L_m) = 0.8, gas flow rate is 1.39 kg/s, **[10]**

Liquid flowrate is 29.5kg/s,

Molecular weight of (SO_2) gas = 64

Molecular weight of air = 29,

Slope of equilibrium line = 27.4

For 38mm ceramic Intalox saddles packings, Fp = 170 m^{-1}

Liquid density = 1000kg/m^3

Liquid viscosity = 10^{-3}Ns/m^2

Pressure drop = 20mm H_2O per meter packing

K_4 = 0.35 and At flooding K_4 = 0.8

Take gas density at 20°C = 1.21kg/m^3

OR

Q4) a) Derive the equation for pipeline design based on fluid dynamic parameters for any one case. **[6]**

b) What are the considerations in restriction orifice sizing? **[4]**

Q5) a) Calculate the optimum pipe diameter of a pipeline to be used for the transportation of water at the rate of 2kg/s. Take density of water 995kg/m^3 and MOC of pipeline as carbon steel. **[8]**

b) State the criteria for selection of piping material and desirable piping materials for corrosion resistance. **[8]**

c) Define Schedule number of pipe. **[2]**

OR

Q6) a) Liquid is flowing through a pipeline with 25mm I.D. for a distance of 2.5 km. The pressure drop = 12m of water. The density of liquid = 1100kg/m^3, viscosity of liquid = 1.1 mNs/m^2. Estimate the flow rate of liquid through the pipeline. **[8]**

b) State the problems raised due to hydrates formation in natural gas pipeline. **[6]**

c) What do you mean by Economic Pipe Diameter? **[4]**

Q7) a) How can scaling be prevented in boilers? **[6]**

b) Explain the Boiler feed water characteristics. **[6]**

c) Describe the functions of the following equipment in steam generation; **[4]**

i) Preheater

ii) Superheater

OR

Q8) a) What is the function of gasket ? What are the desirable characteristics of gasket material? Give the example of any two gasket materials. **[6]**

b) Describe the heat transfer fluids or thermic fluids. **[6]**

c) Define the Enthalpy and Entropy of the steam. **[4]**

Q9) a) Explain the types of plant maintenance in details. **[8]**

b) What are the flame arresters? Explain their functioning in details. **[8]**

OR

Q10) a) Write in details of HAZOP study. **[8]**

b) Why lubrication is necessary part of plant maintenance? Give the names of commonly used lubricants in industries. **[8]**

Total No. of Questions : 10]

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[5871]-683

B.E. (Chemical)

ENVIRONMENTAL ENGINEERING

(2015 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

Q1) Explain impact of thermal, hydro energy, chemical pollution on Environment. **[10]**

OR

Q2) Explain with a neat sketch **[10]**

a) Cyclone separator

b) Fabric filter

Q3) Draw a neat sketch of settling chamber and explain its working mechanism. **[10]**

OR

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

a) Effect of lead on human health

b) methods for removal of NOx

Q5) a) Write note on following water pollutants **[12]**

i) Detergent

ii) Plant nutrient

iii) Inorganic chemicals and minerals

iv) Sediments

b) Explain with a neat sketch Oxygen Sag Curve. **[5]**

OR

P.T.O.

Q6) A large stream has a rate of reaeration K2=0.55 and a rate of deoxygenation K1 = 0.23 per day. The DO deficit of the mixing of stream water and waste water at the point of reference, DO is 4.0 mg/lit and the ultimate BOD of the waste Lu is 75mg/Lit **[17]**

Calculate :

a) The Do deficit at a point one day distant from the point of reference

b) The critical deficit and the critical time.

Q7) Explain activated sludge process with neat diagram. **[16]**

OR

Q8) Explain trickling filter process with neat diagram. **[16]**

Q9) Write and explanatory note on **[17]**

a) Sanitary land filling

b) Incineration

OR

Q10) a) What do you understand by composting? How do you treat solid waste by means of composting? **[9]**

b) What are tertiary treatments? Explain disinfection by UV. **[8]**

Total No. of Questions : 10]

SEAT No. :

P164

[Total No. of Pages : 2

[5871]-684

B.E. (Chemical)

MEMBRANE TECHNOLOGY

(2015 Pattern) (Elective - I) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Give classification of membranes? Give short note on the application any one of membrane? **[6]**

b) Give benefits and drawbacks of membrane processes over conventional separation processes. **[4]**

OR

Q2) a) Explain in details with neat sketches solution coated composite membrane . **[6]**

b) What is importance of additives and solvents in membrane casting? Give any one example. **[4]**

Q3) a) What are the parameter need to be considered during casting of the membrane? Explain with suitable example. **[5]**

b) Explain in details with suitable equation Knudsen diffusion and surface diffusion through micro porous membranes. **[5]**

OR

Q4) a) Give short notes with neat sketches the following **[6]**

1 Hollow fiber module

b) What is osmotic pressure and reverse osmosis? **[4]**

P.T.O.

Q5) a) Explain in details with neat sketches osmotic pressure model. **[8]**

b) Explain in details with neat sketches boundary layer film model. **[8]**

OR

Q6) a) What is membrane fouling? Explain in details methods of reduce fouling. **[8]**

b) What is temperature polarization? Explain with suitable example. **[8]**

Q7) a) What is desalination? Explain in details sea water desalination with suitable sketches. **[10]**

b) Explain in details application of reverse osmosis for waste water treatment. **[6]**

OR

Q8) a) What are criteria's for selection of ultrafiltration membrane in food industries? Give in details with neat sketch any one application in food industry. **[10]**

b) Explain the role of microfiltration membrane in sterile filtration. **[6]**

Q9) a) Describe in details application of membrane in carbon dioxide separation. **[10]**

b) What is membrane bioreactor? Explain in details with neat sketches any one application of it. **[8]**

OR

Q10) a) Explain in details application of membrane for separation of natural gas. **[8]**

b) Describe in details application membrane for recovery of metals from dilute solution. **[10]**

Total No. of Questions : 10]

SEAT No. :

P165

[Total No. of Pages : 2

[5871]-685

B.E. (Chemical Engineering)

CORROSION ENGINEERING

(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates:

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

Q1) Define the following terms with units of each - **[10]**

a) Faradays Laws

b) Specific conduction

c) Specific resistance

d) Electrochemical Principles

e) Transportation Number

OR

Q2) What is Nernst equation for electrode potential? Under what conditions Nernst eqution can be applied to corrosion reactions and calculation of corrosion rates? **[10]**

Q3) Illustrate the need and significance of Pourbaix-diagram for Fe-H_2O system.**[10]**

OR

Q4) Discuss the advantages and disadvantages of Anodic control, Cathodic control and mixed control. **[10]**

P.T.O.

Q5) a) Write a brief note on - **[8]**

i) Pitting Corrosion

ii) Cavitations

b) Explain intergranular and stress corrosion cracking. Discuss the remedial measures for it. **[8]**

OR

Q6) a) Explain the Pilling Bedworth ratio and describe its significance in the mechanisms of oxidation. **[8]**

b) Illustrate the effect of velocity on iron and steel for corrosion in air and aqueous media in detail. **[8]**

Q7) a) What are the different prevention techniques to minimize the corrosion? Write them in brief. **[8]**

b) 'The modification of the material by alloying and the appropriate heat treatment minimizes the corrosion to a great extent" - Justify with suitable examples and neat diagram. **[8]**

OR

Q8) a) Write a note on Nernst equation for electrode potential and that to corrosion reactions also. **[8]**

b) Explain the use of Tafel equation and Evans diagram with suitable illustrations. **[8]**

Q9) a) How metallic and non-metallic linings affects on corrosion? What do you mean by cathodic protection? **[9]**

b) Explain polarization and corrosion potentials. Also explain how the reference electrodes are useful for corrosion measurements with specific example. **[9]**

OR

Q10) a) With a suitable examples illustrate the fretting corrosion. **[9]**

b) Explain the Chemical and Mechanical methods of surface treatment coatings with suitable examples. **[9]**

Total No. of Questions : 10]

SEAT No. :

P166

[Total No. of Pages : 2

[5871]-686

B.E. (Chemical)

PETROLEUM REFINING

(2015 Pattern) (Elective - I) (Semester - I)

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

Instructions to the candidates:

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

Q1) a) Give brief account on origin and exploration techniques of crude? **[5]**

b) Describe the tests and properties of diesel and engine oil. **[5]**

OR

Q2) a) What is the need of refining the crude? Enlist various refining operations & briefly explain any one of them? **[5]**

b) Discuss the growth of the petrochemical industry in India? **[5]**

Q3) What is a cracking operation? Describe catalytic cracking techniques with a schematic diagram? Differentiate between thermal cracking and catalytic cracking? **[10]**

OR

Q4) Describe a vacuum distillation unit with a suitable diagram and distinguish between ADU and VDU with respect to various processing parameters?**[10]**

Q5) a) What is the reforming process? Describe the reforming process with a schematic diagram. **[9]**

b) What is refining operation Describe the manufacture of bitumen with a schematic diagram? **[8]**

OR

P.T.O.

Q6) a) What are additives? Note various additives used in petroleum fractions. **[8]**

b) Why desulphurization is necessary for the refinery? Discuss the Hydro-desulphurization process with a typical schematic diagram along with reaction and operating parameters. **[9]**

Q7) a) Describe the process of hydro-treating with the neat schematic diagram. **[9]**

b) Write in detail about the thermal cracking of H_2S. **[8]**

OR

Q8) a) Discuss the Environmental pollution aspects in the refinery. **[8]**

b) Write in detail about hydrogen sulfide removal processes. **[9]**

Q9) a) Discuss the various techniques used for the transportation of petroleum fractions in the refinery. **[8]**

b) Discuss various safety aspects in the refinery. **[8]**

OR

Q10) a) Write in detail about various storage strategies used in refineries. **[8]**

b) Write in detail about marketing strategies used for petroleum and petroleum products. **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P167

[Total No. of Pages : 2

[5871]-687
B.E. (Chemical)
CHEMICAL PROCESS SYNTHESIS
(2015 Pattern) (409345 A) (Elective-II) (Semester-I)

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

Instructions to the candidates:

1) ***Answer five questions.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of logarithmic tables, electronic pocket calculator and steam tables is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Explain different approach to process development. **[5]**

b) Write in brief different considerations in development of particular process. **[5]**

OR

Q2) Explain about different reaction paths in choice of reactors in detail. **[10]**

Q3) Benzene is to be produced from toluene according to the reaction. **[10]**

$$C_6H_5CH_3 + H_2 \rightarrow C_6H_6 + CH_4$$

Toluene Hydrogen Benzene Methane

Some of the benzene formed undergoes a number of secondary reactions in series to unwanted byproducts that can be characterized by the reaction to diphenyl, according to the reaction:

$$2C_6H_6 \leftarrow C_{12}H_{10} + H_2$$

Benzene Diphenyl Hydrogen

The compositions of the reactor feed and effluent streams. Reactor feed and effluent streams are as follows.

P.T.O.

Component	Inlet flow rate (kmol.h-1)	Outlet flow rate (kmol .h-1)
H_2	1858	1583
CH_4	804	1083
C_6H_6	13	282
$C_6H_5\ CH_3$	372	93
$C_{12}H_{10}$	0	4

Calculate the conversion, selectivity and reactor yield with respect to the:

a) Toluene feed

b) Hydrogen feed.

OR

Q4) a) Explain idealized reactor model for ideal batch reactor, mixed and plug flow reactor. **[10]**

Q5) a) Discuss various types of dryers. **[8]**

b) Explain Chromatography for separation of heterogeneous mixtures with example. **[8]**

OR

Q6) Write notes on: **[16]**

a) Centrifugation

b) Azeotropic distillation.

Q7) Explain with sketches the concept of heat integration of sequences of distillation sequencing using thermal coupling. **[18]**

OR

Q8) a) Discuss integration of heat pump. **[9]**

b) Explain threshold problems in heat exchanger network. **[9]**

Q9) a) Explain the concept of Energy targets in Heat Exchanger Network. **[8]**

b) Explain graphically heat recovery pinch. **[8]**

OR

Q10)a) Explain the intensification of hazardous materials. **[8]**

b) Write in brief on Toxic releases from processes. **[8]**

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

P168 **[Total No. of Pages : 2**

[5871]-689
B.E. (Chemical)
PIPING DESIGN AND ENGINEERING
(2015 Pattern) (Semester - I) (409345C) (Elective - II)

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

Instructions to the candidates:

1) ***Answer Q.No.1 or Q.No.2, Q.No.3 or Q.No.4, Q.No.5 or Q.No.6, Q.No.7 or Q.No.8 Q.No.9 or Q.No.10***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Explain pipe line network analysis. **[10]**

OR

Q2) Discuss the various types of gasket and their selection criteria. **[10]**

Q3) Explain Gate and Globe Valve. **[10]**

OR

Q4) Explain control valve sizing. **[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 1.40×10^{-5} t^2/s over a distance of 138 ft at ground level using a storage tank at an elevation of 25 ft. You can assume minor losses from fittings in the line to account for 6 ft of head. **[8]**

b) Find the head loss due to the flow of 3,500 gpm of oil ($v = 2.15 \times 10^{-4}$ ft^2/s) through 1,500 feet of 6" diameter cast iron pipe. If the density of the oil ρ=2.75 kg/ft^3. **[8]**

OR

Q6) a) Explain line sizing of flare stacks. **[8]**

b) Explain line sizing of vacuum devices. **[8]**

Q7) a) Derive the expression for critical thickness of insulation. **[8]**

b) Calculate the critical radius of insulation for asbestos (k = 0.27 W/m.K) surrounding a pipe and exposed to a room air at 293 K with h=5.0 $W/(m^2.K)$. Calculate the heat loss from 473 K, 40 mm diameter pipe when covered with the critical radius of insulation and without insulation. **[8]**

OR

P.T.O.

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) Develop the piping system layout considerations for Distillation, pumps and heat exchangers? **[18]**

OR

Q10)a) Explain PFD and P & ID. **[9]**

b) Explain Bill of Material and piping isometrics. **[9]**

Total No. of Questions : 10]

SEAT No. :

P169

[Total No. of Pages : 2

[5871] - 690
B.E. (Chemical)
ADVANCED SEPARATION PROCESSES - I
(2015 Pattern) (Semester - I) (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 diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Explain K values and its application in design of multicomponent distillation column. **[10]**

OR

Q2) Explain the working principle of Azeotropic distillation and extractive distillation. **[10]**

Q3) Explain reactive distillation processes. **[10]**

OR

Q4) Explain Distillation Column sequencing. **[10]**

Q5) a) Explain the principle, working and application of reverse osmosis techniques. **[8]**

b) Explain fouling of membrane and concentration polarization. Discuss the methods of controlling the fouling. **[8]**

OR

Q6) a) Explain the principle and working of ultrafiltration. Discuss its applications. **[8]**

b) What is cross flow filtration? What are its advantages over dead end filtration? **[8]**

P.T.O.

Q7) a) Explain the detail working of Chromatography. **[8]**

b) Explain the concept and general principles of adsorption. **[8]**

OR

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

i) Temperature swing adsorption.

ii) Pressure swing adsorption.

b) Write down the applications of chromatography in separation of enzymes, proteins and industrial examples in detail. **[8]**

Q9) a) Explain working principles of zone electrophoresis. **[9]**

b) Write down applications of froath flotation techniques. **[9]**

OR

Q10)a) Write short note on **[9]**

i) Zone refining,

ii) Molecular sieves

b) What is principle and working of ultra centrifugation and discuss its application? **[9]**

Total No. of Questions : 10]

SEAT No. :

P170

[Total No. of Pages : 2

[5871] - 691

B.E. (Chemical Engineering)

PROCESS MODELING AND SIMULATION

(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Explain the terms - Lumped parameter system and distributed parameter system. Give example of each. **[5]**

b) Develop modeling equation of continuity for fluid flow operation. **[5]**

OR

Q2) a) Explain in short, the four different phases of model building. **[5]**

b) Define Process model? Give the classification of model with examples. **[5]**

Q3) a) Develop the modeling equation for the double pipe heat exchanger. **[5]**

b) Derive the model equation for laminar flow in narrow slit. **[5]**

OR

Q4) a) Develop the mathematical model for triple effect evaporator. **[5]**

b) Derive the model equation of flow through packed bed column. **[5]**

Q5) a) Develop the modeling equation for the batch distillation column. **[8]**

b) Draw a model to show a stage extraction and write all notations, assumptions and important parameters need to consider during modeling of extractor. **[8]**

P.T.O.

OR

Q6) a) Develop a model for Flash distillation column. **[8]**

b) Derive the model equation for continuous binary distillation in tray column. **[8]**

Q7) a) Develop the modeling equation for the following Plug Flow Reactor by considering axial position. **[9]**

b) As semi-batch reactor is run at constant temperature by varying the rate of addition of one of the reactants "A". The irreversible exothermic reaction is first order in reactants "A" & "B". The tank is initially filled to its 40% level with pure reactant "B" at a concentration C_{BO}. Maximum cooling water flow is begun, and reactant "A" is slowly added to the perfectly stirred vessel. Write the equations describing the system. Without solving the equations, try to sketch the profiles of $F_A.C_A$. & C_B with time during the batch cycle. **[9]**

OR

Q8) a) Derive a mathematical model for the batch reactor in which the first order consecutive reactions $A \rightarrow B \rightarrow C$ (k1, k2, k3 rate constant) takes place to get the product B. **[9]**

b) Derive the model equation for Bio-chemical reactor. **[9]**

Q9) a) Write short notes on use of numerical methods to solve the differential equations. **[8]**

b) Give the scope of process simulation with an example. **[8]**

OR

Q10) a) Derive the model equation for effluents treatment reactor. **[8]**

b) Explain utilization of HYSIS Software in modeling and simulation in detail. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P171

[Total No. of Pages : 3

[5871]-692

B.E. (Chemical Engineering)

PROCESS ENGINEERING COSTING & PLANT DESIGN

(2015 Pattern) (Semester - II)

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

Instructions to the candidates:

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

Q1) Explain significance of laboratory data in processes development. **[10]**

OR

Q2) With specific example explain concept of capitalized cost. **[10]**

Q3) The annual direct production cost for a plant operating at 70 percent capacity are Rs. 2,80,000 while the sum of the annual fixed charges, overhead costs, and general expenses is Rs 2,00,000. What is break even points in units of production per year if total annual sales are Rs.5,60,000 and the product sells at Rs. 40 per unit? What were the annual gross earnings and net profit for this plant at 100 percent capacity when corporate income taxes required a 15 percent tax on first Rs. 50,000 of annual gross earning, 25 percent on annnual gross earning of Rs. 50, 000 to 75,000, 34 percent on annual gross earnings above Rs. 75,000 and 5 percent on annual gross earnings from Rs. 1,00,000 to 3,35,000. **[10]**

OR

Q4) Draw and explain the tree diagram showing the cumulative cash position of cash flow for an industrial operation. **[10]**

Q5) a) The following shows the effect of the variable x and y in the total cost for a particular operation: **[8]**

$C_T = 2.33\ x + (11900/xy) + 1.86\ y + 10$

Determine the values of x and y.

b) Explain the optimum conditions in batch and cyclic operation. **[8]**

P.T.O.

OR

Q6) a) Obtain the iterative solution of LP Problem and solve for the maximum using simplex method : **[8]**

Maximize : $f = x_1 + 3x_2$

Subject to $-x_1 + x_2 + x_3 = 1$

$x_1 + x_3 + x_4 = 2$

$x_1 > 0 : i = 1, ..., 4$

Where x_3, x_4 are slack variables.

b) Explain breakeven chart for optimization with significances. **[8]**

Q7) a) Write the steps to determine height and diameter of different process equipment's at conditions of optimum cost. **[8]**

b) Derive the following equation for optimum insulation and write for maximum loss. **[8]**

$$D_{opt} = 2\ K_m / (h_c + h_r)_c$$

OR

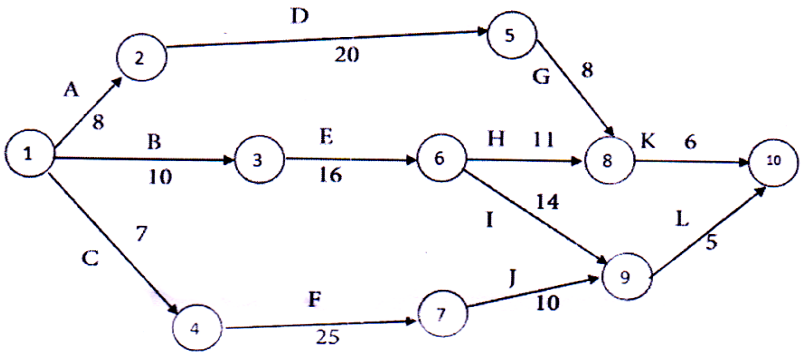
Q8) a) Write the steps for preparation of techno economic feasibility report. **[8]**

b) Write a note on Pinch technology. **[8]**

Q9) a) Draw the network diagram and determine the critical path for the following project. **[9]**

Activity	Time (Week)
1-2	5
1-3	6
1-4	3
2-5	5
3-6	7
3-7	10
4-7	4
5-8	2
6-8	5
7-9	6
8-9	4

b) Find out the completion time and the critical activities for the following project. **[9]**



OR

Q10) a) Explain the role of Project Engineering in any chemical plant. **[9]**

b) Explain organization of design report for any chemical plant. **[9]**

Total No. of Questions : 10]

SEAT No. :

P172

[Total No. of Pages : 1

[5871]-693

B.E. (Chemical)

ENERGY CONSERVATION IN CHEMICAL PROCESS INDUSTRIES

(2015 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, ELECTRONIC POCKET CALCULATOR and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) Discuss the energy needs of growing economy. **[10]**

OR

Q2) Give the Classification of energy sources. **[10]**

Q3) Define energy audit and explain the need, types of energy audit. **[10]**

OR

Q4) Explain the role, responsibilities and duties of Energy Manager. **[10]**

Q5) Discuss the Human aspect of energy conservation, involvement tree, elements of energy management program. **[16]**

OR

Q6) Discuss in detail about the Management and organization of Energy Conservation Programs in Industries. **[16]**

Q7) a) Give the checklist for energy conservation in Boilers. **[8]**

b) How and where the energy losses can be minimized in coolers. **[8]**

OR

Q8) Explain about the improving Process Operations for Energy Conservation in heat exchangers and evaporators. **[16]**

Q9) Explain Waste minimization and Resource Conservation in fertilizer industry. **[18]**

OR

Q10) Explain Waste Minimization and Resource Conservation in petroleum industry. **[18]**

♣ ♣ ♣

Total No. of Questions : 10]

SEAT No. :

P173

[Total No. of Pages : 2

[5871]-694

B.E. (Chemical Engineering)

CHEMICAL PROCESS SAFETY

(2015 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain methods to handle toxic substances. **[5]**

b) Explain Fatal Accident Rate (FAR). **[5]**

OR

Q2) a) With the help of sketch explain dose versus response curves. **[5]**

b) How toxicants are eliminated from biological organisms? Explain briefly. **[5]**

Q3) a) What are the government regulations pertaining to Industrial Hygeine? Explain in detail. **[5]**

b) Explain estimation methods for Worker Exposures to Toxic Vapors. **[5]**

OR

Q4) a) What is the role of Material Safety Data Sheets in Industrial Hygiene? **[4]**

b) Explain Flammability Diagram. How is it used to Avoid Flammable Atmospheres. **[6]**

Q5) a) Explain relief systems, its risks and management. **[10]**

b) Explain following terms briefly : **[7]**

i) Flammability limits
ii) Fire point
iii) Dermal absorption
iv) Deflagration
v) Explosion

P.T.O.

OR

Q6) a) With the help of diagram, explain the Fire Triangle. **[7]**

b) List and explain miscellaneous design aspects for Preventing Fires and Explosions. **[10]**

Q7) a) What are the objectives of hazard survey? How these surveys are conducted? **[10]**

b) Explain the stages in hazards identification and risk assessment procedure. **[7]**

OR

Q8) a) What is fire triangle? Distinguish between Fires and Explosions. **[10]**

b) Explain in detail about Process hazards Checklists. **[7]**

Q9) a) What is HAZOP? Explain in details. **[8]**

b) Describe the role of chemical engineers in preventing hazards. **[8]**

OR

Q10) a) What are runaway reactions? Explain with Examples. **[8]**

b) What is role of computers in Safety Management? **[8]**

Total No. of Questions : 10]

SEAT No. :

P174

[Total No. of Pages : 2

[5871]-695

B.E. (Chemical)

FOOD TECHNOLOGY

(2015 Pattern) (Semester - II) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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 suitable diagrams wherever necessary.***
4) ***Use of scientific calculators is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) Write a note on Ohmic Heating with neat diagram. **[5]**

b) Write the short notes on following. **[5]**

i) Freezing and drying of food

ii) Food Additives

OR

Q2) Write the advantages and disadvantages of extrusion cooking and hydrostatic pressure-cooking methods. **[10]**

Q3) a) Draw a milk powder processing flow diagram with stepwise procedure. **[5]**

b) What do you mean by aseptic canning technology? Explain it in brief. **[5]**

OR

Q4) a) Draw and explain the ice cream production with preservation. **[5]**

b) Explain the theory and process of butter making. **[5]**

Q5) Write the note on following : **[18]**

a) Hot air dehydration.

b) Laws of size reduction for food grains processing.

c) Freeze drying and freeze concentration.

OR

P.T.O.

Q6) a) Enlist the various factors considered while deciding packaging materials. Explain with suitable example. **[9]**

b) Explain the roasting and hot oil frying theory in detail. **[9]**

Q7) a) Write a note on bar code and other markings printed on food packets. Also explain combined packaging system. **[8]**

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

i) Food containers and its effect on shelf life

ii) Advantages of crates, plywood and wire bound boxes in packaging.

OR

Q8) a) Explain the principles for the development of protective packaging and list its advantages in brief. **[8]**

b) Write a short note on following packaging materials - **[8]**

i) Textiles and wood packing

ii) Metal and Aluminum packing

Q9) a) Justify - "The concepts of rheology are useful in food quality assurance". **[8]**

b) Write a note on 'Codex Almentarious' for food quality assurance. **[8]**

OR

Q10) a) Write a detailed note on food adulteration and food safety. **[8]**

b) Write a note on food regulation and its importance in food materials. **[8]**

Total No. of Questions : 10]

SEAT No. :

P175

[Total No. of Pages : 1

[5871]-696

B.E. (Chemical)

ADVANCED MATERIALS

(2015 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) Explain austempered ductile iron and give its applications. **[10]**

OR

Q2) Explain UHMWPE. **[10]**

Q3) Explain advanced ceramic materials in detail. **[10]**

OR

Q4) Explain the advantages and applications of advanced polymeric material. **[10]**

Q5) Give the phase selection criteria and reinforcing mechanism along with advantages and disadvantages of composite material. **[16]**

OR

Q6) a) Explain the industrial application of composite material. **[8]**

b) Explain fiber winding technique in detail. **[8]**

Q7) a) Explain the difference between metal composite and ceramic composite materials. **[8]**

b) Explain fabrication method of ceramic composite. **[8]**

OR

Q8) Give the type of reinforcement and explain in detail each type. **[16]**

Q9) a) Explain air craft materials. **[9]**

b) Explain the synthesis and characterization of nonmaterial. **[9]**

OR

Q10) Explain the properties and fabrication method of the carbon composite. **[18]**

♣ ♣ ♣

Total No. of Questions : 10]

SEAT No. :

P176

[Total No. of Pages : 2

[5871]-697
B.E. (Chemical)
CATALYSIS
(2015 Pattern) (Elective - IV) (Semester - II)

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

Instructions to the candidates :

1) ***Neat diagram must be draw 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) Explain the homogeneous and heterogeneous catalysis with an example. **[10]**

OR

Q2) Explain the application of the catalysis to industrial processes in the inorganic, fine organic chemical and biochemical industries. **[10]**

Q3) Explain the mechanism of adsorption and its isotherms in detail. **[10]**

OR

Q4) Give the characteristics of catalysis. **[10]**

Q5) a) Explain the BET method in detail. **[8]**

b) Explain the deactivation of the catalysis. **[8]**

OR

Q6) a) Explain mass transfer in the catalysis. **[8]**

b) Explain the mechanism of solid - catalyzed reaction in detail. **[8]**

Q7) a) Give the application of the zeolites. **[8]**

b) Explain the catalyst cracking with application. **[8]**

OR

Q8) a) Explain the zeolites structure based on the sodalite cage. **[8]**

b) Explain the molecular sieves with industrial application. **[8]**

P.T.O.

Q9) a) Explain the special features of M-M equation. **[6]**

b) Propose the mechanism of the enzyme - substrate reaction, **[12]**

$A \xrightarrow{\text{Enzyme}} R$, it is observed that this reaction exhibits the following behavior.

i) The rate proportional to the total enzyme concentration (C_{EO}) at all C_A.

ii) The rate proportional to the C_A at low C_A.

iii) The rate is independent on C_A at high C_A.

OR

Q10)a) Give the kinetics of competitive inhibition. **[6]**

b) While carrying out number of separate runs different concentrations of substrate and enzyme are introduced into a batch reactor. After lapse of certain time. The reaction is quenched and the reactor contents are analyzed. Find the rate equation to represent the action of enzyme on substrate from the following data. **[12]**

Run	C_{Eo} (mol/m^3)	(C_{Ao}(mol/m^3)	C_A (mol/m^3)	t(hr)
1	3	400	10	1
2	2	200	5	1
3	1	20	1	1

Total No. of Questions : 10]

SEAT No. :

P177

[Total No. of Pages : 2

[5871] - 698

B.E. (Chemical)

NANOTECHNOLOGY

(2015 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer Q.No.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to right indicates full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write a short note on Diamonded nanostructures? **[5]**

b) List any four applications of buckyballs and carbon nanotubes. **[5]**

OR

Q2) a) Explain the methods used for the synthesis of graphite? **[5]**

b) What are the challenges faced by researchers in nanotechnology. **[5]**

Q3) a) Explain the top-down and bottom-up approaches for the synthesis of nanomaterials. **[5]**

b) Explain pulsed laser deposition with its schematic layout. List its advantages. **[5]**

OR

Q4) a) Explain the principle and operation of the SPM-AFM techniques. **[5]**

b) Explain the working of scanning tunneling microscopy (STM) with a neat sketch? **[5]**

Q5) a) Explain how quantum cryptography is used for secure data communication. **[10]**

b) Explain the Pauli exclusion principle along with the application. **[7]**

P.T.O.

OR

Q6) a) Write a short note on extrinsic semiconductors and intrinsic semiconductors. **[10]**

b) Write down the short note on Quantum Cryptography. **[7]**

Q7) a) Explain electrical phenomena at interfaces Van der Waals forces between colloidal particles. **[10]**

b) What are the factors affecting contact angles and colloidal stability. **[7]**

OR

Q8) a) List the methods for producing carbon nanotubes and explain any of the methods with a neat sketch? **[10]**

b) Write a note on photocatalysis of nanostructured materials? **[7]**

Q9) a) Discuss Nano-biotechnology and explain how nanostructure mediated drug delivery helps in the treatment of various diseases? **[8]**

b) Explain the health and environmental impacts of nanotechnology. **[8]**

OR

Q10)a) Write briefly on the commercial process of nanotechnology and its application in chemical engineering. **[8]**

b) Describe the use of Nano electronics with suitable examples. **[8]**

▽▽▽▽

Total No. of Questions : 08]

SEAT No. : ____

P178

[Total No. of Pages : 2

[5871] - 699

B.E. (Chemical)

FUEL CELL TECHNOLOGY

(2015 Pattern) (Elective - IV) (Semester - II)

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

Instructions to the candidates :

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

Q1) a) Note the construction and working of Voltaic Cells. **[5]**

b) What are Tafel plots? Derive Tafel equation from the first principles. Describe its use in the fuel cell design. **[7]**

c) Describe various ways by which hydrogen can be stored in a hydrogen based fuel cell unit. Also discuss difficulties cum challenges for the same. **[8]**

OR

Q2) a) Describe classification of Electrodes. **[5]**

b) Describe the mechanism of electrode reaction occurring at the surface of electrodes. **[8]**

c) Describe the construction and working of the hydrogen fuel cell. **[7]**

Q3) Illustrate a fuel cell with reactant/product gasses and the ion conduction flow directions through the PEM cell. **[16]**

OR

Q4) Describe various anodic catalyst materials used in the construction of a Proton Exchange Membrane Fuel Cell and their possible functions in its working.**[16]**

P.T.O.

Q5) Write in brief on treatment of electrolyte interface in Solid Oxide Fuel Cells. **[17]**

OR

Q6) Explain why heat recovery systems are required in fuel cell. Also describe any one heat recovery system in details used in the fuel cell system consisting of SOFC. **[17]**

Q7) A Fuel Cell system uses multiple reactors and sorbents as Fuel Processor. Discuss its nature and advantages over single processor system. **[17]**

OR

Q8) Describe in detail the Life cycle analysis of fuel cells. **[17]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

P2303

[Total No. of Pages : 2

[5871]-700
B.E. (Chemical)
PETROCHEMICAL ENGINEERING
(2015 Pattern) (Elective - IV) (Semester - II) (409352D)

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

Instructions to the candidates :

1) ***Answer any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Assume suitable data, if necessary.***

Q1) Describe the main building blocks for petrochemical synthesis and their sources. **[10]**

OR

Q2) Write short note on Petrochemical industries in India. **[10]**

Q3) Draw and explain production of ethylene and write down its products. **[10]**

OR

Q4) Write in details about the various separation and purification techniques used in Petrochemical industry? **[10]**

Q5) a) With neat sketches explain in detail about production Ethylene glycol as a second generation intermediates. **[8]**

b) Write short note on different types of furnaces used in petrochemical plants. **[8]**

OR

Q6) a) How the olefins and aromatics are used to produce second generation intermediates? Explain with example. **[10]**

b) Write a note on Fluid Catalytic Cracking units. **[6]**

P.T.O.

Q7) a) Define polymerization. Describe the steps and mechanisms of addition Polymerization. **[9]**

b) Describe in detail bulk, emulsion and suspension types of polymerization. **[9]**

OR

Q8) a) With neat sketches explain in detail about production of Teflon along with its Engineering Problems. **[9]**

b) What is addition polymerization? Describe the steps and mechanisms of addition Polymerization. **[9]**

Q9) Write in detail about pollution control - norms and methods of elimination in petrochemical industries. **[16]**

OR

Q10)Write a note on following : **[16]**

a) Safety consideration in petrochemical plants

b) CPCB norms in Petrochemical industries

Total No. of Questions : 8]

SEAT No. : ____

P180

[Total No. of Pages : 2

[5871]-701
B.E. (Computer Engineering)
HIGH PERFORMANCE COMPUTING
(2015 Pattern) (Semester - I)

Time : 2 ½ 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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***Justify answer with an example wherever necessary.***

Q1) a) Explain the term of all-to-all broadcast on linear array, mesh & hypercube topologies. **[8]**

b) Write short note on circular shift. **[6]**

c) Explain Multi-core architecture **[6]**

OR

Q2) a) Explain the methods for containing Interaction overheads. **[8]**

b) Explain Mapping Techniques for load balancing. **[6]**

c) Write characteristics of tasks. **[6]**

Q3) a) Explain sources of overhead in parallel program. **[8]**

b) Explain the performance metrics for parallel system. **[8]**

OR

Q4) a) Write a short note on minimum & cost optimal execution time. **[8]**

b) Explain parallel Matrix-vector multiplication algorithm with example. **[8]**

P.T.O.

Q5) a) What are the issues in sorting on parallel computers with example. **[8]**

b) Modify BFS for parallel execution & analyze its complexity **[8]**

OR

Q6) a) Explain Dijkastra algorithm in parallel formulation. **[8]**

b) Explain communication Strategies for Parallel BFS. **[8]**

Q7) a) Draw and explain CUDA architecture in details **[8]**

b) List APIs for dealing with CUDA device memory. **[5]**

c) Explain different kind of CUDA memory. **[5]**

OR

Q8) a) Explain how the CUDA C program executes at kernel level with example. **[8]**

b) How synchronization manage in CUDA with example? **[5]**

c) Give five application of CUDA. **[5]**

Total No. of Questions : 10]

SEAT No. :

P974

[Total No. of Pages : 2

[5871]-702
B.E. (Computer Engineering)
ARTIFICIAL INTELLIGENCE AND ROBOTICS
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain constraint satisfaction with examples. **[8]**

b) Give and Explain Hill Climbing algorithm. **[6]**

OR

Q2) a) How planning strategies are classified. Explain in detail. **[8]**

b) Explain Constraint Satisfaction with N-Queens problem. **[6]**

Q3) a) Give Algorithm for Backtracking and Look ahead Strategies of Constraint Satisfaction. **[8]**

b) Explain Knowledge Based Reasoning with details. **[6]**

OR

Q4) a) With examples explain Propositional and First Order Logic. **[8]**

b) Explain Deductive Retrieval with Backward Chaining in details. **[6]**

Q5) a) Explain all Stages in natural language Processing with examples. **[8]**

b) Explain Application of NLP in Machine Translation, Information Retrieval and Big Data Information Retrieval. **[6]**

OR

P.T.O.

Q6) a) Write a short note on Supervised, Unsupervised and Reinforcement learning. **[8]**

b) Explain Feed forward and Feedback ANNs. **[6]**

Q7) a) Explain Sensing and mapping for Point Robot. **[8]**

b) Explain Non Visual Sensors like : Contact Sensors and Inertial Sensors. **[6]**

OR

Q8) a) Draw and Explain Hybrid Control Architecture. **[8]**

b) Write a short note on Human-Robot Interface. **[6]**

Q9) a) Explain in details laser Rangefinders and Biological Sensing. **[8]**

b) Explain Robot Pose Maintenance and Localization. **[6]**

OR

Q10)a) Write a short note on Topological Maps and Geometric Maps. **[8]**

b) Explain in details Intelligent Vehicles. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P181

[Total No. of Pages : 2

[5871]-703
B.E. (Computer Engg.)
DATA ANALYSIS
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain the major characteristics of Big Data. **[5]**

b) What is the hypothesis? Explain with a suitable example the term hypothesis testing? **[5]**

OR

Q2) a) Explain each phase in the data analytics life cycle? **[5]**

b) What is an analytic sandbox, and why is it important? **[5]**

Q3) a) Explain Student's t-test method with an example. In which condition will you select Student's t-test? **[5]**

b) What are the problems with the Apriori algorithm? How do we improve the efficiency of the Apriori algorithm? **[5]**

OR

Q4) a) What is ANOVA stands for? Explain the term ANOVA with a suitable example? **[5]**

b) Explain Support, Confidence, Lift, and Leverage, and also explain their importance in the association rule? **[5]**

P.T.O.

Q5) a) Explain the Decision tree algorithm with an example? **[7]**

b) What is data smooting? Explain the steps involved in the data smoothing process? **[8]**

OR

Q6) a) What is Gini Index? Explain in brief the CART algorithm? **[7]**

b) Write the mathematical equation for the Bayes theorem and explain it with a suitable example? **[8]**

Q7) a) What is meant by machine learning? Explain supervised - unsupervised learning algorithms. **[7]**

b) Explain in brief, different conventional data visualization tools? **[8]**

OR

Q8) a) What are the major applications of the association rule algorithm? Explain the reason for applying the association rule to the mentioned applications? **[7]**

b) Explain in brief, different conventional data visualization tools? What is data visualization? Explain the five main products of Tableau. **[8]**

Q9) a) Explain the major features of HBase? Discuss the applications where HBase was used? **[5]**

b) Explain Apache Hadoop & HDFS with a neat diagram. **[7]**

c) Explain how Apache Pig can be used to analyze large sets of data? **[8]**

OR

Q10)a) Differentiate between SQL & NoSQL. **[5]**

b) Explain the Storage Mechanism in HBase. **[7]**

c) Explain the component diagram which depicts the architecture of Hive? **[8]**

Total No. of Questions : 8]

SEAT No. : ____

P182

[Total No. of Pages : 2

[5871] - 704

B.E. (Computer Engineering)

DIGITAL SIGNAL PROCESSING

(2015 Pattern) (Semester - I) (Elective - I)

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

Instructions to the candidates :

1) ***Q.1 and Q.2 are compulsory.***
2) ***Solve Q.3 or Q.4,Q.5 or Q.6 and Q.7 or Q.8.***
3) ***Assume suitable data if required.***
4) ***Figure to the right indicate full marks.***

Q1) a) Explain the process of ADC and DAC Conversion with block diagram? **[5]**

b) Explain causal and Non-causal system? Test the causality of following system **[5]**

i) $y(n) = x(n) - x(n\text{-}2)$ ii) $y(n) = n\ x(n)$

Q2) a) Determine Inverse Z-transform of following function? **[5]**

$X(Z) = Z^2 / Z^2 - Z + 0.5$

b) Explain Twiddle Factor & Draw basic diagram of 8-pt DFT using DIT radix - 2 FFT? **[5]**

Q3) a) What is ROC? Explain its properties also define ROC for various finite & infinite discrete time signals? **[8]**

b) Determine Impulse response of an LTI system is $h(n) = \{1, 0, 2, -2\}$. Find the response of the system for the input $x(n) = \{1, 2, 0, 3\}$ using linear convolution? **[8]**

OR

Q4) a) Find the Direct form-I and Direct form-II realizations of a discrete time system represented by transfer function **[8]**

$$\frac{H(Z) = 2Z^3 - 4Z^2 + 11Z - 8}{(Z-8)(Z^2 - Z + 3)}$$

b) Explain Pole Zero Plot? Explain relation between X-Plan & Z-Plan? **[8]**

P.T.O.

Q5) a) Design a Linear Plan FIR low pass filter using rectangular window by taking 7 samples of window sequence & cutoff frequency wc = 0.2π rad/sample. **[8]**

b) Explain Gibbs phenomenon in detail? **[5]**

c) Distinguish IIR & FIR filters? **[5]**

OR

Q6) a) Write the procedure for Designing FIR filter using Fourier method. **[6]**

b) For the analog transfer function $H(S) = 2/S^2 + 3S + 2$ determine H(Z) using Impulse invariant transformation if **[7]**

i) T = 1 sec & ii) T = 0.1 sec

c) Explain Bilinear Transform (BLT) of IIR filter? In brief explain frequency warping? **[5]**

Q7) a) Explain S-plane to Z-Plane mapping for order of n =5? **[8]**

b) Write a short note on features of ADSP 21XX processors? Explain use of DAG1 and DAG2? **[8]**

OR

Q8) a) Explain in detail Architecture of SHARC DSP Processor? **[8]**

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

i) FIR system DIRECT, CASCADE and Parallel Form

ii) IIR systems DIRECT, CASCADE and Parallel Form

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P183

[Total No. of Pages : 2

[5871]-705

B.E. (Computer Engineering)

SOFTWARE ARCHITECTURE AND DESIGN

(2015 Pattern) (Semester - I) (Elective - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Why Software Architecture is important in designing software. **[5]**

b) What makes "Good" Architecture? **[5]**

OR

Q2) a) Define quality attributes. Explain any one Quality Attribute Scenario. **[5]**

b) Explain Performance tactics in detail. **[5]**

Q3) a) How are quality attributes achieved in software designing and development? **[5]**

b) Why availability tactics plays an important role in Air traffic Control. **[5]**

OR

Q4) a) What are design patterns?Explain their categories. **[5]**

b) How Design patterns solve design problems during software design. **[5]**

Q5) a) Explain Abstract Factory design pattern with an example. **[8]**

b) Identify a case study and apply Singleton pattern design pattern on it. **[8]**

OR

P.T.O.

Q6) a) What do you understand by Facade design pattern. How it is used in software design. **[8]**

b) Identify and explain a problem where Adapter design pattern can be applied. **[8]**

Q7) a) Explain the importance of N-tier Web Architecture. What is the difference between N-tier architecture and MVC architecture? **[8]**

b) Create one XML document. Compare and contrast XML with JSON? **[8]**

OR

Q8) a) Show the Life cycle of Java Applet with neat diagram. **[8]**

b) Write XML DTD and XML Schema structure for a student management system. **[8]**

Q9) a) What do you understand by Middleware Technologies? Give the importance of Server Side Technology : MVC. **[9]**

b) Show the architecture for Java EE Technologies : **[9]**

i) JMS ii) JDBC

OR

Q10) a) Server Side Technologies are used in multi-tier architectures. Elaborate. Give the use of server side technology : struts. **[9]**

b) Explain EJB 3.0 Architecture. Explain Message Beans with example. **[9]**

Total No. of Questions : 10]

SEAT No. :

P184

[Total No. of Pages : 2

[5871]-706

B.E. (Computer Engineering)

PERVASIVE & UBIQUITOUS COMPUTING

(2015 Pattern) (Elective - I) (Semester - I) (410244 (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) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Define Pervasive Computing? List and explain any two applications of Pervasive Computing. **[6]**

b) Define Context Aware? Demonstrate the context aware applications and steps to develop them. **[4]**

OR

Q2) a) Describe about SyncML framework for data synchronization with neat diagram. **[6]**

b) What is ambient service? Explain the concept of ambient service in detail. **[4]**

Q3) a) Describe the architecture of WAP. What are the advantages and disadvantages of WAP? **[6]**

b) Explain the two classes of cryptographic algorithms **[4]**

OR

Q4) a) Explain the challenges of speech recognition techniques **[6]**

b) Write short note on Java Speech API and its components. **[4]**

P.T.O.

Q5) a) What is Servelt? Write a program to access a bean holding consumer data to print out the first and last name of a consumer using JSP. **[8]**

b) With a neat diagram explain the architecture of J2EE application model.**[8]**

OR

Q6) a) Explain SOAP web services and its parts. What are the steps to creating and using web services? **[8]**

b) Is JSP too inflexible for web applications? Justify. Explain the pattern which is used to overcome the problem for separation of responsibilities? **[8]**

Q7) a) What is user interfaces? How it becomes intelligent? **[5]**

b) Explain star model for user-centered design with suitable diagram. **[6]**

c) Describe various security issues while designing user interfaces. **[6]**

OR

Q8) a) What is smart card? Write it's applications. **[5]**

b) What are the five application areas where we felt that Touche could have the largest impact? **[6]**

c) What are the different wearable input output devices? Explain with examples. **[6]**

Q9) a) What are the different searching methods for location data. Explain with examples. **[7]**

b) What is augmented reality? Where is augmented reality being used? What are the applications of augmented reality with illustration of each? **[10]**

OR

Q10) a) Define Context? Comment on Context Awareness? **[7]**

b) Explain how to develop, deploy and evaluate the pervasive computing applications. **[10]**

Total No. of Questions : 10]

SEAT No. :

P185

[Total No. of Pages : 4

[5871]-707
B.E. (Computer Engg.)
DATA MINING AND WAREHOUSING
(2015 Pattern) (Semester - I) (410244 D) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) How to compute dissimilarity for binary attributes with examples. **[4]**

b) Explain Knowledge discovery from data or KDD. **[6]**

OR

Q2) a) Explain types of attributes with examples. **[4]**

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, 16, 17, 20, 22, 25, 25, 28, 30, 35, 40, 42, 42, 45, 50, 52, 55, 60, 60, 62, 62, 65, 70 Partition them into three bins by each of the following methods.

i) Equal-frequency partitioning

ii) Equal-width partitioning

Use *smoothing by bin means* to smooth the above data. **[6]**

Q3) a) Explain any two data reduction techniques. **[4]**

b) Compare Online Analytical Processing (OLAP) and Online Transaction processing (OLTP). **[6]**

OR

Q4) a) Explain following. **[5]**

i) Minskowski Distance

ii) Euclidean distance

P.T.O.

b) Briefly compare the following concepts. You may use an example to explain your point(s). **[6]**

Snowflake schema, fact constellation, star schema.

Q5) a) Consider the market basket transactions shown below: **[6]**

Transaction ID	Items bought
T1	{M, A, B, D}
T2	{A, D, C, B, F}
T3	{A, C, B, F}
T4	{A, B, D}

Assuming the minimum support of 50% and minimum confidence of 80%

i) Find all frequent itemsets using Apriori algorithm.

ii) Find all association rules using Apriori algorithm.

b) Explain mining Multilevel association rules. What is Uniform support? **[6]**

c) Define support and confidence for an association rule. **[4]**

OR

Q6) a) A database has five transactions. Let $min\_sup = 60\%$ *and* $\min\_conf = 80\%$ **[6]**

TID	items _bought
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M, A, K, E}
T400	{M, U, C, K, Y}
T500	{C, O, O, K, I, E}

i) Find all frequent itemsets using FP-growth

ii) List all the strong association rules (with support s and confidence c)

b) Explain the following terms: **[6]**

i) Constraint based rule mining

ii) Closed and maximal frequent itemsets

c) What do you mean by frequent item set, Closed item set? Explain with example. **[4]**

Q7) a) Define Classification and Prediction. Explain decision tree based Classification method with suitable example. **[8]**

b) Describe K-Nearest Neighbor classifiers with suitable example. **[6]**

c) Write short note on Rule Induction Using a Sequential Covering Algorithm. **[4]**

OR

Q8) a) Explain the following **[8]**

i) Gini index

ii) Gain ratio

iii) Information gain

b) Differentiate between Supervised and unsupervised Learning **[6]**

c) What are Bayesian classifiers? **[4]**

Q9) a) Explain following with example **[8]**

i) Accuracy

ii) Error Rate

iii) Precision

iv) Recall

b) Describe following. **[8]**

i) Multiclass classification

ii) Reinforcement learning

OR

Q10)a) Explain in detail following techniques to evaluate the accuracy of a Classifier. **[8]**

i) Holdout method

ii) Cross validation

b) Explain following **[8]**

i) Systematic learning

ii) Wholistic learning

Total No. of Questions : 8]

SEAT No. :

P186

[Total No. of Pages : 2

[5871] - 708
B.E. (Computer Engineering)
DISTRIBUTED SYSTEMS
(2015 Pattern) (Semester - I) (410245A) (Elective - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagram must be drawn whenever necessary.***
4) ***Assume suitable data if necessary.***

Q1) a) What is transparency in distributed system? Explain any four types of transparency in distributed system. **[6]**

b) Describe fundamental models in distributed system. **[6]**

c) Explain Lai-Yang algorithm in detail. **[8]**

OR

Q2) a) Explain RMI in detail. **[6]**

b) Describe Ring election algorithm in detail. **[6]**

c) Explain token passing algorithm for mutal exclusion in distributed system. **[8]**

Q3) a) Explain the methods of implementing transactions. **[8]**

b) Describe what is distributed consensus? How consensus is applicable in synchronous system. **[9]**

OR

Q4) a) Explain various methods of recovery from failures in distributed system. **[8]**

b) Describe what is atomic commit protocol. Explain different ways of implementing atomic commit protocols. **[9]**

P.T.O.

Q5) a) Explain consistency model for mobile clients. **[8]**

b) Describe the following in brief. **[9]**

i) Atomic multicast

ii) IP multicast

iii) Application layer multicast

OR

Q6) a) Explain data-centric consistency models. **[8]**

b) Describe the following in brief **[9]**

i) Reliable multicast

ii) Open groups for group communication

iii) Ordered multicast.

Q7) a) Explain optimistic simulation in detail. **[8]**

b) Explain different types of attacks possible in distributed system. **[8]**

OR

Q8) a) Explain conservative simulation in brief. **[8]**

b) Explain security mechanisms to thwart various attacks in DS. **[8]**

Total No. of Questions : 12]

SEAT No. :

P187

[Total No. of Pages : 2

[5871] - 709
B.E. (Computer Engg.)
SOFTWARE TESTING AND QUALITY ASSURANCE
(Semester-I) (2015 Pattern) (410245B) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Assume Suitable Data if necessary. Mention your assumptions.***
2) ***Right indicates the full marks and Bifurcation for sub questions.***
3) ***Draw suitable diagrams and tables if necessary.***

Q1) What is Software Quality? Explain continual improvement cycle with neat labeled diagram of PDCA framework. **[6]**

OR

Q2) a) Explain customer's view of quality.

b) Define following terms:

i) Defect

ii) Benchmarking

iii) Metrics

[6]

Q3) a) What do you mean by following software testing terms: Bug, Error and Mistake?

b) What is Test Plan Document? List and explain any two components of the Test Plan document.

[7]

OR

Q4) a) What are the skill set required by Software Tester?

b) Write short note on Mutation testing?

[7]

Q5) a) Explain Test automation framework with suitable diagram.

b) Differentiate between Automation testing and Manual testing.

[3+4=7]

OR

Q6) a) Explain features of good testing.

b) List and explain requirements for test tool.

[3+4=7]

P.T.O.

Q7) a) What is Selenium? What are different features of Selenium IDE?
b) List automation tools for software testing. Describe QTP in detail.
c) What are selenium test design considerations?

[6+5+5=16]

OR

Q8) a) State & explain the components of Selenium tool.
b) Write short note on Selenium Grid.
c) Differentiate between Selenium Web Driver and Selenium RC.

[6+5+5=16]

Q9) a) What is SQA? List various elements of SQA & describe any two in detail.
b) State & explain Principles of Quality management.
c) What is ISO standard? What are its advantages?

[6+6+5=17]

OR

Q10)a) What is Six Sigma? Explain the terms DMAIC & DMADV.
b) What are different quality dimensions suggested by Garvin?
c) How cost and risk factors are affecting software quality.

[6+6+5=17]

Q11)a) Write short note on Total Quality Management (TQM).
b) Explain following terms (any two)
i) Checklists
ii) Histogram
iii) Run Charts
c) Describe in detail Defect Injection & Defect Removal activities for a development process.

[6+6+5=17]

OR

Q12)a) Enumerate Ishikawa's seven basic quality tools. Explain any two in detail.
b) Describe key elements of Total Quality Management.
c) Explain with example Product Quality Metric.

[6+6+5=17]

♦ ♦ ♦

Total No. of Questions : 8]

SEAT No. :

P 188

[Total No. of Pages : 6

[5871] - 710
B.E. (Computer Engineering)
OPERATION RESEARCH
(2015 Pattern) (Semester - I) (410245C) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Figures to the right indicate full marks.***
3) ***Neat and clear diagrams must be drawn whenever necessary.***
4) ***Make suitable assumptions whenever necessary.***

Q1) a) What are the characteristics of Linear Programming. What is the significance of constraints? List and explain the application domains of the same. **[6]**

b) Give the Correspondence between entities in primal and dual for a linear programming problem with an example. **[6]**

c) A company owns two flour mills viz. A and B, which have different production capacities for high, medium and low quality flour. The company has entered a contract to supply flour to a firm every month with at least 8, 12 and 24 quintals of high, medium and low quality respectively. It costs the company Rs. 2000 and Rs. 1500 per day to run the mill A and B respectively. On a day, Mill A produces 6, 2 and 4 quintals of high, medium and low quality flour, Mill B produces 2, 4 and 12 quintals of high, medium and low quality flour respectively. It is required to determine how many days per month should each mill be operated in order to meet the contract order most economically. Formulate the problem in the form of linear programming problem. **[8]**

OR

Q2) a) How are Linear Programming Problems formulated? What is the significance of Objective Function? Explain with an example. **[6]**

b) Solve the following two-variable Linear Programming Problem graphically. **[6]**

Maximize $Z = 3 x_1 + 2 x_2$

Subject to constraints:

$(1/40) x_1 + (1/60) x_2 \leq 1$

$(1/50) x_1 + (1/50) x_2 \leq 1$

$x_1 \geq 30$

$x_2 \geq 30$

$x_1, x_2 \geq 0$

P.T.O.

c) A salesman has to travel between cities selling products. He visits cities A, B, C, D and E. The distances between the cities is as given in the table below. Solve the Travelling Salesman Problem, **[8]**

i) indicate the route followed,

ii) mention the distance travelled in kilometers.

		To City				
		A	B	C	D	E
	A	--	17	16	18	14
From	B	17	--	18	15	16
City	C	16	18	--	19	17
	D	18	15	19	--	18
	E	14	16	17	18	--

Q3) a) Solve the following 2×m game using the graphical method. **[8]**

	B1	B2	B3	B4	B5
A1	2	–2	5	–2	6
A2	–2	4	–3	1	0

b) Solve the following Assignment problem using the Hungarian method. **[8]**

	Job 1	Job 2	Job3
Worker 1	15	10	9
Worker2	9	15	10
Worker3	10	12	8

OR

Q4) a) 5 kg knapsacks to be filled with items as given in table. The knapsack is to be filled to maximize the benefits. Use Dynamic Programming approach to solve the problem. **[8]**

Item No.	Weight (kg)	Benefit
1	3	100
2	2	20
3	4	60
4	1	40

b) Solve the following game using linear programming. **[8]**

	B1	B2	B3
A1	7	8	5
A2	9	6	9.5
A3	10.5	9	6.5

Q5) a) The following details are available regarding a project. Draw the Network Diagram. Identify the critical path, the critical activities and the duration of project completion. **[8]**

Path	Time Duration (Weeks)
1-2	5
1-3	6
1-4	3
2-5	5
3-6	7
3-7	10
4-7	4
5-8	2
6-8	5
7-9	6
8-9	4

b) A company is considering expansion in either Pune or Nasik, or perhaps in both the cities. The company wants at-most one new warehouse, but the choice is restricted to the city where the new factory will be located. The cost considerations are as given below. The Total Available Capital is Rs. 10 Lakhs. **[8]**

No.	Yes/No Question	Decision Variable	Net Present Value (in Lakhs)	Capital Required (in Lakhs)
1	Build Factory in Pune	X1	9	6
2	Build Factory in Nashik	X2	5	3
3	Build Warehouse in Pune	X3	6	5
4	Build Wareshouse in Nashik	X4	4	2

The objective is to find the feasible combination of alternatives that maximises the total net present value. Formulate a binary-integer-programming problem to help the decision markers to decide on the steps ahead.

OR

Q6) a) The following details are available regarding a project. Derive a solution using Dynamic Programming approach (backwards) to determine the critical path, the critical activities and the project completion time. **[8]**

Activity	Predecessor (Activity)	Duration (Weeks)
A	--	3
B	A	5
C	A	7
D	B	10
E	C	5
F	D,E	4

b) The following details are available regarding a project. Determine the earliest start time and latest finish times, the total float for each activity.**[8]**

Activity	Predecessor	Estimated Duration (in weeks)
A	--	2
B	A	4
C	B	10
D	C	6
E	C	4
F	E	5
G	D	7
H	E,G	9
I	C	7
J	F,I	8
K	J	4
L	J	5
M	H	2
N	K,L	6

Q7) a) A manufacturer makes three types of products A, B, C. The fixed and variable costs of the products are as given below.

	Fixed cost (Rs.)	Variable Cost per Unit (Rs.)
Product A	20,000	15
Product B	30,000	12
Product C	50,000	8

The likely demand in units of these products are 3000, 6000 or 9000 depending upon poor, moderate or high demand scenarios.

The Selling price of each type of Product is Rs. 20.

Prepare the payoff matrix. Based on the payoff matrix indicated which product should be launched in the market, if the manufacturer is an Optimist (use the maxi-max criteria). **[9]**

b) A mining company owns two different mines that produce an ore which, after being crushed, is graded into three classes: high, medium and low grade.

The company has contracted to provide a smelting palnt with 12 tons of high grade, 8 tons of medium-grade and 24 tons of low-grade ore per week. The two mines have different operating characteristics as detailed below.

	Cost per day	High	Medium	Low
Mine A	180	6	3	4
Mine B	160	1	1	6

Formulate a Goal programming problem for the mining company so as to determine how many days per week should each mine be operated to fulfill the smelting plant, assuming we can work no more than Six days per week on each mine. **[9]**

OR

Q8) a) A manufacturing company makes two products- A and B. According to the previous experience, production of either product A or product B requires an average of one hour in the plant. The plant has a normal production capacity of 300 hours a month. The marketing department of the company reports that because of limited market, the maximum number of product A and product B that can be sold in a month are 140 and 200 respectively. The net profit from the sale of product A and product B are Rs. 600 and Rs. 200 respectively. The manager has set the following goals.

P_1: To avoid any underutilization of normal production capacity.
P_2: Sell rnaximum possible units of product A and B. Since the net profit from the sale of product A is thrice the amount from Product B, therefore, the manager has thrice as much desire to achieve sales for product A as for Product B.
P_3: Minimize the overtime operation of the plant as much as possible.
Formulate a Goal programming problem for the same. **[9]**

b) A manufacturer makes three types of products A, B, C. The fixed and variable costs of the products are as given below.

	Fixed cost (Rs.)	Variable Cost per Unit (Rs.)
Product A	20,000	15
Product B	30,000	12
Product C	50,000	8

The likely demand in units of these products are 3000, 6000 or 9000 depending upon poor, moderate or high demand scenarios.

The Selling price of each type of product is Rs. 20.
Prepare the payoff matrix. Based on the payoff matrix indicate which product should be launched in the market, if the manufacturer is an Pessimist (use the maxi-min criteria). **[9]**

Total No. of Questions : 10]

SEAT No. :

P189

[Total No. of Pages : 2

[5871] - 711
B.E. (Computer Engineering)
MOBILE COMMUNICATION
(2015 Pattern) (Semester - I) (Elective - II) (410245D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain Base station and base station controller in detail. **[6]**

b) Explain Radio Spectrum and its uses. **[4]**

OR

Q2) a) Explain PCS Architecture in detail. **[6]**

b) What is effect of Length of Antenna in cellular Network. **[4]**

Q3) a) Write short note on Handoff/ Handover. **[4]**

b) Explain FHSS and DSSS. **[6]**

OR

Q4) a) Explain SDMA, FDMA & CDMA. **[6]**

b) Short Note on cell Splitting and frequency Reuse. **[4]**

Q5) a) With the help of neat diagram Explain GSM Speech Encoding and Decoding. **[6]**

b) Explain GSM Identifiers. **[6]**

c) Short note on GSM frame. **[6]**

OR

Q6) a) With block diagram explain GPRS. **[6]**

b) With the help of Diagram explain the Incoming and outgoing call setup. **[6]**

c) Give the Basic GSM Architecture. Explain of each block. **[6]**

P.T.O.

Q7) a) With block diagram explain UMTS. **[6]**

b) Explain EV-DO (Evolution - Data Optimized). **[6]**

c) Compare EDGE and WCDMA. **[4]**

OR

Q8) a) What are the three main CDMA 2000 std and explain all three: **[6]**

b) Explain LTE in 4G. **[6]**

c) Gave detail about HSDPA. **[4]**

Q9) a) Explain all Advance mobile technologies in detail. **[8]**

b) Describe in detail Virtual Reality and Augmented Reality. **[8]**

OR

Q10)a) Explain Millimeter Wave, and its use in advance mobile technologies. **[8]**

b) Explain 5GAA (Autonomous Automation). **[8]**

Total No. of Questions : 8]

SEAT No. :

P190

[Total No. of Pages : 3

[5871]-712
B.E. (Computer Engineering)
MACHINE LEARNING
(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right indicates full marks.***

Q1) a) What is Overfitting and Underfitting in machine learning model? Explain with an example. **[6]**

b) Differentiate with an example Label encoder and One Hot encoder for managing categorical data. **[6]**

c) How Ridge Regression help for regularizing linear models? Write Scikit-Learn code for Ridge Regression. **[8]**

OR

Q2) a) Explain Data formats for supervised learning problem with example. **[6]**

b) Write a Scikit-learn code to manage missing values of the given 3-D dataset using mean and median strategy : **[6]**

X	V	Z
1	NaN	2
2	3	NaN
1	4	2

c) What do you mean by Logistic Regression? Explain with example. **[8]**

Q3) a) What do you mean by Support Vector Machine? Explain with example. **[8]**

b) Write short notes on : **[9]**

i) Bernoulli naive Bayes

ii) Multinomial naive Bayes

iii) Gaussian naive Bayes

P.T.O.

OR

Q4) a) Explain with example how Bayes theorem helps to classify the data using Naïve Bayes Classification technique. **[8]**

b) Differentiate between linear SVM and non-linear SVM. **[4]**

c) Write and Explain Scikit-learn code for Gaussian naive Bayes classifier. **[5]**

Q5) a) Explain with example the role of attribute selection measure in building decision tree. **[8]**

b) Write and explain data formats for clustering technique. **[5]**

c) Explain Elbow method for finding optimal number of clusters. **[4]**

OR

Q6) a) Consider the following data set consisting of the scores of two variables on each of seven individuals: Apply Kmeans clustering to cluster this data into 2 clusters. **[8]**

Subject	A	B
1	1.0	1.0
2	1.5	2.0
3	3.0	4.0
4	5.0	7.0
5	3.5	5.0
6	4.5	5.0
7	3.5	4.5

b) Write short notes on : **[9]**

i) Bagging

ii) Boosting

iii) Random Forests

Q7) a) Explain with example Naïve User based Recommendation systems. **[8]**

b) What is agglomerative clustering? Explain with example. **[8]**

OR

Q8) a) Perform the complete link hierarchical clustering using similarity matrix given below : Show the Dendrograms **[8]**

	A	B	C	D
A	0	1	4	5
B		0	2	6
C			0	3
D				0

b) Explain with example common architectural principles of deep networks. **[8]**

Total No. of Questions : 10]

SEAT No. :

P191

[Total No. of Pages : 2

[5871] - 713

B.E. (Computer)

INFORMATION AND CYBER SECURITY

(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Compare between symmetric key encryption and asymmetric key. **[5]**

b) Using Hill Cipher, encrypt plain text "COE" key is "ANOTHERBZ". **[5]**

OR

Q2) a) Illustrate the crypt analysis with dictionary attack. **[5]**

b) Use single columnar transposition to encrypt plaintext "Come home soon" and use the key "HEAVEN". **[5]**

Q3) a) Explain feirtel cipher in detail. **[5]**

b) Explain digital signature algorithm. **[5]**

OR

Q4) a) Differentiate Block Cipher and Stream Cipher. Also explain both. **[5]**

b) Explain working of AES algorithm. **[5]**

Q5) a) Discuss the transport mode and tunnel mode of IP sec in detail. **[6]**

b) Explain secure socket layer handshake Protocol in detail. **[6]**

c) What is VPN? Explain types of VPN. **[6]**

OR

P.T.O.

Q6) a) Explain ISAKMP protocol of IPSec. **[6]**

b) Explain working of PGP in detail. **[8]**

c) Explain various participants required in secure electronic transaction. **[4]**

Q7) a) Explain operation of anomaly based intrusion detection system. **[8]**

b) Describe working of packet filtering firewall. **[8]**

OR

Q8) a) Explain working of Application gateways. **[8]**

b) List limitations of Fire Wall. **[4]**

c) What is trusted system? Explain in brief. **[4]**

Q9) a) Discuss PII confidentiality safeguard. **[8]**

b) Who are cyber criminals? What are types of cyber criminals. **[8]**

OR

Q10) a) Explain life cycle of cyber forensics? Explain with diagram. **[8]**

b) Explain personally identifiable information (PII). Describe PII impact levels with examples. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. :

P192

[Total No. of Pages : 2

[5871] - 714

B.E. (Computer Engineering)

ADVANCED DIGITAL SIGNAL PROCESSING

(Elective - III) (2015 Pattern) (Semester - II) (410252A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

Q1) a) Define and state the properties of 1-D DFT and 2-D DFT. **[5]**

b) Why FIR filters are widely used for adaptive filters? Discuss the minimum MSE criteria to develop an adaptive FIR filter. **[5]**

OR

Q2) a) Why LMS algorithm is called as stochastic gradient algorithm? List the drawbacks of LMS algorithm. **[5]**

b) What is multi rate signal processing? Explain any one applications of multi rate signal processing in brief. **[5]**

Q3) a) How multi-rate systems are used in sub band coding of speech and image signal? **[5]**

b) Compare various windows used in the design of FIR filters. **[5]**

OR

Q4) a) How a speech signal can be filtered in DFT domain? **[5]**

b) Give a brief account of poly phase filter structures. **[5]**

Q5) a) State the various performance parameters used for the analysis of Nonparametric methods. Compare the methods w.r.t. these parameters. **[9]**

b) Explain in brief application of WT in signal compression and signal filtering. **[9]**

P.T.O.

OR

Q6) a) Define 1-D DCT and IDCT. State properties of DCT. What do you meant by basis function and basis vectors? **[9]**

b) What is Periodogram? With block diagram, describe how DFT can be used for power spectrum estimation. **[9]**

Q7) a) Explain Text-to-Speech conversion system with block schematic? State different applications of TTS. **[8]**

b) What is vector quantization? How it is used in speech processing. **[8]**

OR

Q8) a) Explain in brief Adaptive Transform Coding and Harmonic Coding w.r.t. speech coding. **[8]**

b) What do you mean by Speech Synthesis and Recognition? What do you understand by feature extraction? State at least 2 methods in brief. **[8]**

Q9) a) How digital image is represented by means of digital computer? How gray scale image is different than colour image? What is Histogram of an image? **[8]**

b) How LPF and HPF are used for image enhancements? Discuss these methods mathematical models. **[8]**

OR

Q10) a) Discuss Wiener and Median filters with its mathematical model. **[8]**

b) With example, explain the process of Histogram equalization and Histogram stretching. **[8]**

▽▽▽▽

Total No. of Questions : 10]

SEAT No. : ____

P193

[Total No. of Pages : 2

[5871] - 715

B.E. (Computer Engineering)

COMPILERS (Elective - III)

(2015 Pattern) (Semester - II)

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

Instructions to the candidates :

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

Q1) a) Explain the role of Lexical Analyzer. **[5]**

b) How automatic construction of parser done using YACC? **[5]**

OR

Q2) a) Explain Error detection and recovery in YACC. **[5]**

b) Differentiate between Top-Down and Bottom Up Parsing. **[5]**

Q3) a) Construct LR(0) item-set for following grammar. **[5]**

E -> E + E | E * E| id Where +, *, id are terminals

b) Write a short note on : **[5]**

i) SLR ii) LALR Parser

OR

Q4) a) Explain how syntax translation scheme is implemented with topdown parser. **[5]**

b) What is three address code? What are the different representations for three address code? Write three address code for following statement

a = b * c + d / f - h **[5]**

Q5) a) Explain following storage allocation schemes with proper examples : **[6]**

i) Stack Storage Allocation ii) Static Storage Allocation

iii) Heap Storage Allocation

b) Describe in detail Dynamic Scope. **[6]**

c) Explain translation of OO Constructs. **[6]**

P.T.O.

OR

Q6) a) Explain translation of control structure with proper examples. **[6]**

b) Describe in detail Dangling Pointer. **[6]**

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

i) Nested Blocks ii) Function call and returns

Q7) a) Write a note on application of Directed Acyclic Graph (DAG) in code generation. **[4]**

b) Show the steps involved on generating the code for the expression : **[4]**

$(x + y)/(p + q)$

c) Explain code generation for control flow statements. **[8]**

OR

Q8) a) Describe in detail about a simple code generator with the appropriate algorithm. **[4]**

b) What is Register Allocation and Assignment problem? **[4]**

c) Explain Issues in code generation. **[8]**

Q9) a) Write a short note on Data flow equations and iterative data flow analysis. **[8]**

b) Explain following optimizations with examples : **[8]**

i) Common sub expression elimination

ii) Strength reduction

iii) Code movement

iv) Variable propagation

OR

Q10) a) Discuss about the following : **[8]**

i) Dead-code Elimination and ii) Code motion.

b) What is code optimization? Differentiate among local, global and loop optimization. **[8]**

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Total No. of Questions : 10]

SEAT No. :

P194

[Total No. of Pages : 2

[5871]-716
B.E. (Computer Engineering)
EMBEDDED AND REAL TIME OPERATING SYSTEM
(2015 Pattern) (Elective - III) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***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 embedded system? List and explain different challenges of embedded system. **[5]**

b) What are the different types of processor technologies used in embedded system design? **[5]**

OR

Q2) a) List and Explain software tools used for designing of an embedded system. **[5]**

b) Describe different forms of memories in the embedded system. **[5]**

Q3) a) Enlist various Internet enabled system protocols and explain one with its features. **[5]**

b) Explain least slack time first scheduling and latest release time scheduling in real time systems. **[5]**

OR

Q4) a) Explain Serial protocol RS-232C in detail with neat diagram. **[5]**

b) Enlist various Internet enabled embedded system protocols and explain any one with its features and diagram. **[5]**

Q5) a) What is priority inversion problem in real time systems? How this problem can be solved? **[5]**

b) Explain why PCI/X buses are used for high speed data transfer. **[5]**

c) How to represent Precedence constraints and data dependency among real-time tasks? Explain with diagram. **[6]**

P.T.O.

OR

Q6) a) Explain message queues with suitable diagram. **[5]**

b) Explain Serial protocols RS-232C & RS-485. **[5]**

c) Explain in detail Parallel ports I/O Interfacing with neat diagram. **[6]**

Q7) a) What are various Real-time requirements in the domain of Signal processing or Multimedia. **[6]**

b) What are the different types of semaphores and where they are used? **[5]**

c) Write Shote notes on RT Linux, Vx Works? **[5]**

OR

Q8) a) What is Semaphore? How does it help in resource sharing in RTOS Kernel? **[6]**

b) Explain semaphores message queues, mailboxes? **[5]**

c) How interrupts are handled in RTOS environment? **[5]**

Q9) a) Explain with example Validation and debugging in an embedded system. **[6]**

b) Draw and explain model of real-time communication with related terminologies. **[6]**

c) List capabilities of commercial real-time operating systems. Enlist the features of RTLinux. **[6]**

OR

Q10)a) What are issues in resource reservation. **[6]**

b) Explain Resource reservation protocol with diagram. **[6]**

c) Describe the embedded software development process. **[6]**

Total No. of Questions : 10]

SEAT No. : ____

P195

[Total No. of Pages : 2

[5871]-717

B.E. (Computer)

SOFT COMPUTING & OPTIMIZATION ALGORITHMS

(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates :

1) ***Solve Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Figures to the right side indicate full marks.***

Q1) a) Write short note on fuzzy membership function and state its importance in fuzzy logic. **[5]**

b) What are the diffrent properties associated with fuzzy set? **[5]**

OR

Q2) a) Write short note on fuzzification & defuzzification. **[5]**

b) Explain in detail singleton method for fuzzification. **[5]**

Q3) a) What is the importance of fuzzy logic system in Artificial Intelligence, give an example. **[10]**

b) How is fuzzy relation converted into a crisp set - relation using lamda cut process. **[5]**

OR

Q4) a) Explain the following **[10]**

i) Working principle of Genetic Algorithm

ii) Rank selection in Genetic Algorithm

b) State & differentiate between traditional algorithm & genetic Algorithm. **[5]**

P.T.O.

Q5) a) What is an Evolutionary system? How it helps to solve problems? **[8]**

b) How Genetic Algorithm is different than evolutionary strategies. **[5]**

OR

Q6) a) Explain Boltzmann selection mechanism. **[8]**

b) What is steady state selection Algorithm. **[5]**

Q7) a) What is fitness function? Explain its role in Genetic Algorithm? **[8]**

b) Discuss any two applications of Genetic Algorithm. **[8]**

OR

Q8) a) What is classifier system? Explain Holland classifier systems. **[8]**

b) Write a note on: Roulette wheel selection method. **[8]**

Q9) a) State & explain different cross over operator in Genetic Algorithm. **[8]**

b) What do you understand by tournament selection? Explain in detail. **[8]**

OR

Q10)a) Short note on

i) Particle swarm optimization Algorithm. **[10]**

ii) Ant colony optimization (ACO).

b) State & explain differences between Real Ants & Artificial ants. **[6]**

Total No. of Questions : 10]

SEAT No. :

P2304

[Total No. of Pages : 2

[5871]-718
B.E. (Computer Engg.)
SOFTWARE DEFINED NETWORKS
(2015 Pattern) (Elective - IV) (Semester - II) (410253-A)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Explain the need of SDN over traditional networks. **[5]**

b) Explain in brief the major characteristics of Software Defined Networks. **[5]**

OR

Q2) a) Explain message types and how pipeline processing is carried out in Open Flow. **[5]**

b) Differentiate between ONF and SDN devices. **[5]**

Q3) a) Define use of POX, Beacon, Floodlight, Ryu and Open Daylight. **[5]**

b) Explain how packet forwarding is carried out in Open Flow Switch. **[5]**

OR

Q4) a) What is foodlight controller? Explain the benefits of foodlight controller. **[5]**

b) Enlist Open Source Controllers available for SDN implementation and explain any three in brief. **[5]**

Q5) a) Explain how Ryu controller is used to increase the agility of the network. **[8]**

b) State various Tunneling Technologies required for Data Centers and explain in brief. **[8]**

OR

P.T.O.

Q6) a) Write Short note on Failure recovery and Multi Tenancy issues in Data Centers. **[8]**

b) What are the different use cases in the data center? Explain traffic engineering for WANS. **[8]**

Q7) a) What are the risks needed to consider for implementing network functions virtualization for the service providers? **[9]**

b) List and illustrate various benefits of Network Function Virtualization. **[9]**

OR

Q8) a) What are the challenges for Network Function Virtualization? Enlist the leading NFV vendors. **[9]**

b) Write in detail the parts of network function virtualization architecture. **[9]**

Q9) a) Demonstrate the use of Service Networks and Carrier Networks with proper explanation. **[8]**

b) What are the Campus Networks? Where are they used? Justify your answer with suitable applications. **[8]**

OR

Q10)a) Explain how campus networks are having the capability to use SDN's flow rules. **[8]**

b) What are the Hospitality Networks? Explain its usages with suitable real-time application as an example. **[8]**

Total No. of Questions : 8]

SEAT No. :

P196

[Total No. of Pages : 2

[5871] - 719

B.E. (Computer Engineering)

HUMAN COMPUTER INTERFACE

(2015 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Figures to right indicate the marks to the question.***
3) ***Assume suitable data whenever necessary.***

Q1) a) What is HCI? What is role of Psychology, Ergonomics and Understanding in HCI? **[6]**

b) Explain comparison between Human and Computer? **[8]**

c) What is GOMS model? Explain stage-wise use of GOMS is HCI Patterns. **[6]**

OR

Q2) a) What is the role of Java and AWT in designing and developing HCI Application? **[6]**

b) What are the basic human and computer abilities required for HCI? Explain any three of each in detail. **[8]**

c) Which are the various Technologies and Designing Techniques used for the Web Applications along with HCI? **[6]**

Q3) a) Discuss about Evaluation through user participation in details. **[6]**

b) Write down various Issues arises in Design. Evaluation, and Implementation of Mobile Devices. **[6]**

c) Explain Web Browsers by Considering following Terms : **[6]**

i) Fonts

ii) Color Pallet

iii) Color Depth

P.T.O.

OR

Q4) a) Explain mobile devices applied in HCI using following terms: (any Two) **[6]**

i) design

ii) limitations

iii) future enhancements

b) Which are the different approaches to user modeling in knowledge representation in adaptive help system of user support. **[6]**

c) What are the goals of evaluation process? Elaborate Evaluation through Expert Analysis and Evaluation through User Participation. **[6]**

Q5) a) What are the differences and Similarities between Predictive Models and Cognitive Models? **[8]**

b) Write Short Note on Socio-Organizational Issues and Stakeholder Requirements and Heuristic Evaluation. **[8]**

OR

Q6) a) Discuss about Cognitive model in detail. **[8]**

b) What is the role of Evaluation applied for Cognitive Models along with Users. **[8]**

Q7) a) What do you mean by Task Analysis? Which are three different approaches to task analysis? Explain each with suitable example. **[8]**

b) What is importance of Design of Every Day Things (DOET) in HCI? **[8]**

OR

Q8) a) What is role of the Hierarchical model representation in designing task and structure? Explain in detail. **[8]**

b) Write short note on any two following Testing : **[8]**

i) User Testing

ii) Usability Testing

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Total No. of Questions : 10]

SEAT No. :

P197

[Total No. of Pages : 2

[5871]-720

B.E. (Computer)

CLOUD COMPUTING

(2015 Pattern) (Semester - II) (Elective - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is cloud computing? Explain its advantages and disadvantages? **[5]**

b) Write note on GFS and HDFS? **[5]**

OR

Q2) a) Write note on solution stacks : LAMPand LAPP. **[5]**

b) Explain the concept of cloud storage with storage as a service? **[5]**

Q3) a) Explain in brief : implementation levels of virtualization with architecture? **[5]**

b) Explain saas in brief. **[5]**

OR

Q4) a) Explain cloud Data stores. **[5]**

b) What is hypervisor? List and explain types of Hypervisor in brief. **[5]**

Q5) a) What are AWS load balancing services? Explain Elastic Load Balancer with its types. **[9]**

b) Explain steps to create EBS snap shot. **[8]**

OR

Q6) a) Explain the steps for configuring EC2 server? **[9]**

b) Explain the steps of creating amazon S3 bucket and managing associated services? **[8]**

P.T.O.

Q7) a) What are cloud mashups? Explain idea of cloud mashups with advantages? **[9]**

b) Explain cyber physical systems and components? **[8]**

OR

Q8) a) What are cloud lets? Explain in details. **[9]**

b) Explain the innovative applications of IOT. **[8]**

Q9) a) Explain the concept of Autonomic cloud Engine. **[8]**

b) Explain the client server architecture of docker? What are network ports and unix sockets? **[8]**

OR

Q10) a) Write note on following : **[10]**

i) The future of cloud TV

ii) Future of cloud Based smart Devices.

b) Explain Docker with respect to process simplification, Broad support and Adoption, Architecture? **[6]**

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Total No. of Questions : 10]

SEAT No. :

P198

[Total No. of Pages : 2

[5871]-721

B.E. (Computer Engineering)

BUSINESS INTELLIGENCE

(2015 Pattern) (Elective - IV) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, 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 High level architecture of BI with suitable diagram. **[5]**

b) Define decision support system and explain different types of DSS. **[5]**

OR

Q2) a) Does mathematical model play important role in BI? Justify your answer? **[5]**

b) Leading newspaper portal has decided to build dashboard for live covid19 cases. Identify different visualization method which can be added to this dashboard? Justify your answer. **[5]**

Q3) a) What is parameterizing reports and self-service reporting? **[5]**

b) Explain the extended structure of DSS? **[5]**

OR

Q4) a) Define Types of Decision Support System (DSS)? **[5]**

b) Write Role of Business Intelligence in DSS? **[5]**

Q5) a) Differentiate between OLAP & OLTP. **[6]**

b) What are the major task in data preprocessing? Explain with suitable examples. **[5]**

c) Explain the following data reduction strategies. **[6]**

i) Dimensionality Reduction

ii) Numerosity Reduction

OR

P.T.O.

Q6) a) Explain phases of data pre-processing? **[6]**

b) Explain following OLAP operations **[6]**

i) Roll Up

ii) Drill Down

c) Write a short note on data transformation. **[5]**

Q7) a) Explain Apriori Algorithm and Solve by using Apriori Algorithm for following table with support 60% And confidence 80% **[10]**

Find the strong Association rule

Tid	Item set
1	f,a,c,d,g,i,m,p
2	a,b,c,f,l,m,o
3	b,f,h,j,o
4	b,c,k,s,p
5	a,f,c,e,l,p,m,n

b) Explain the Hierarchical Methods of clustering. **[7]**

OR

Q8) a) Explain Naive Baye's Classification in detail. **[10]**

b) Describe the essential features of decision trees in context of classification. **[7]**

Q9) a) Differentiate between Business analytics & Data analytics. **[5]**

b) Write a Short note on ERP & BI Applications. **[5]**

c) Define Role of BI in Bonking with suitable example. **[6]**

OR

Q10) a) Explain BI Applications in CRM? **[5]**

b) Define role of business analytics with example. **[5]**

c) Explain BI Applications in Telecommunications? **[6]**

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Total No. of Questions : 10]

SEAT No. :

P2313

[Total No. of Pages : 3

[5871]-722

B.E. (Computer Engineering)

ENTERPRISE RESOURCE PLANNING

(2015 Pattern) (Elective - IV) (Semester - II) (410253DB)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, 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 following terms : **[4]**

i) Warehouse

ii) Work Centers

b) What are the different jobs-based DEM roles in a Production Department in Infor LN? Explain the organization chart and duties of the various members in a typical Production Dept. **[6]**

OR

Q2) a) Define ERP and Illustrate the benefits of ERP in detail. **[4]**

b) Draw a block diagram showing a logistic & finance company for Enterprise Resource Planning being implemented showing Master data and transactional data in an Infor LN? **[6]**

Q3) a) List down the typical routing components of a routing operation in a Manufacturing organization and explain how it is managed? **[4]**

b) Explain the following terms in detail. **[6]**

i) ITEM Structure and order policies

ii) ITEM standard Cost and Cost Calculation

OR

P.T.O.

Q4) a) What is a session and what are session components in Infor LN? Describe session flow with a flow chart diagram. **[4]**

b) What are the typical modules made available in an ERP application? Explain the function of any two modules. **[6]**

Q5) a) Explain role of Warehousing department in Procure to Pay Process of Infor LN in details. **[4]**

b) List the steps required to complete Reverse Logistics in Infor LN. **[6]**

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

i) ATP/CTP

ii) Cost Price of an item

OR

Q6) a) Draw and explain Purchase Agreement Process in Procure to Pay process in Infor LN. **[4]**

b) List out the various departments and activities that are encountered in a Procure to Pay cycle using a small flowchart in Infor LN. **[6]**

c) List and explain the steps required to complete Procure to Pay Process in Infor LN. **[6]**

Q7) a) Explain Order to Cash Process using a Real time Scenario in Infor LN. **[6]**

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

i) Sales user profile.

ii) Sales order fulfilment workbench.

c) Explain goods (Out) in shipping process in Infor LN. **[6]**

OR

Q8) a) List Out the steps in the sales order process with suitable example. **[6]**

b) Explain the Central invoicing in the Order to Cash Process in Infor LN. **[6]**

c) List out the various departments and activities that are encountered in Order to Cash cycle (both external and internal) using a small flowchart in Infor LN. **[6]**

Q9) a) Explain the golden rules of accounting with their examples. **[4]**

b) Draw and explain a department structure of following departments. **[6]**

i) Production Department

ii) Warehouse Department

iii) Accounts Payable Dept.

c) List down the steps in short which are executed in the Design to deployprocess from the engineering department to the Planner, Supervisor, Operator &Production Manager converting from E-BOM to P-BOM in Infor LN. **[6]**

OR

Q10) a) Draw and explain a department structure of following departments. **[4]**

i) Purchase Department

ii) Sales Department

b) Differentiate and explain trial balance and a balance sheet? **[6]**

c) Using the organization chart explain the roles of all the key Managers that report to a Chief Finance Officer (CFO)? **[6]**

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Total No. of Questions : 10]

SEAT No. : ____

P199

[Total No. of Pages : 2

[5871]-723

B.E. (Computer Engineering)

Big Data and Data Analytics

(2015 Pattern) (Open Elective) (Semester - II)

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

Instructions to the candidates:

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

Q1) a) Explain Business Intelligence with suitable diagram. **[5]**

b) Explain following terms in the context of data warehouse **[5]**

i) Subject oriented

ii) Non-volatile

OR

Q2) a) Explain Decision Support System with its limitations. **[5]**

b) What is Big data analytics? **[5]**

Q3) a) Draw and Explain typical analytical architecture. **[5]**

b) What are the applications of Big data analytics? **[5]**

OR

Q4) a) Explain "Model Building" as the phase of data analytic lifecycle. **[5]**

b) Explain "Operationalization" as the phase of data analytic lifecycle. **[5]**

Q5) a) What is Machine Learning? **[6]**

b) Explain linear regression with suitable example. **[5]**

c) Describe support vector machine with suitable example. **[6]**

OR

P.T.O.

Q6) a) What are the applications of machine learning? **[6]**

b) Explain logistics regression with suitable example. **[5]**

c) Describe time series analysis with suitable example. **[6]**

Q7) a) What is the classification problem? **[8]**

b) Describe classification tree with suitable example. **[5]**

c) Explain the hierarchical method of clustering. **[4]**

OR

Q8) a) What are various classification models? **[6]**

b) Describe Bayesian method with suitable example. **[6]**

c) Explain the partition method of clustering. **[5]**

Q9) Write Short Note on:

a) Basic Features of R **[5]**

b) Data Frames and Lists **[5]**

c) Reading Data Sets and Exploring Data from R **[6]**

OR

Q10) Write Short Note on:

a) Exploring R GUI **[5]**

b) Handling Data in R Workspace **[5]**

c) Manipulating and Processing Data in R **[6]**

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Total No. of Questions : 10]

SEAT No. :

P200

[Total No. of Pages : 2

[5871]-724

B.E. (Information Technology)

INFORMATION AND CYBER SECURITY

(2015 Pattern) (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, 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 necesary.***

Q1) a) Give examples of replay attack. List general approaches for dealing with replay attack. **[6]**

b) Illustrate different steps in RSA Algorithm for Key generation, Encryption and decryption. **[4]**

OR

Q2) a) What is PGP protocol are the services provided by PGP protocol? **[6]**

b) Illustrate passive attacks with suitable examples. **[4]**

Q3) a) Using Chinese remainder theorem, solve for x the following. **[6]**

$x \equiv 2 \pmod 3$**;**

$x \equiv 3 \pmod 5$**;**

$x \equiv 2 \pmod 7$**;**

b) What are the three criteria's to be satisfied by cryptographic hash function. **[4]**

OR

Q4) a) Draw the general structure of DES and explain the one round of DES algorithm. **[6]**

b) Explain ESP protocol Header of IPsec with Diagram? **[4]**

P.T.O.

Q5) a) State and explain steps in the Risk management cycle. **[8]**

b) What are the four-risk control strategies in Information security? **[8]**

OR

Q6) a) State and explain any four risk assessment methodologies. **[8]**

b) What is role of risk mitigation in ISRM? **[8]**

Q7) a) Define cybercrime, Based on the subject of the crime classify cybercrime. **[8]**

b) How does Social Engineering attack occur, give examples, and list techniques to prevent it. **[10]**

OR

Q8) a) Define and explain cyber terrorism. What is the motivation for Cyber Terrorism? **[10]**

b) Write short note on Cybercrime and cloud security. **[8]**

Q9) a) What is Digital signatures as per Indian IT Act and how does that act deal with Digital signature. **[8]**

b) What is Phishing? What are the techniques used by phishers to launch it? **[8]**

OR

Q10)a) Write short note on Indian IT Act 2000 and amendments in 2008? **[8]**

b) How do proxy servers and anonymizer function? Justify Proxy server and Anonymizers as tool for cybercrime. **[8]**

Total No. of Questions : 10]

SEAT No. :

P201

[Total No. of Pages : 2

[5871]-725
B.E. (Information Technology)
MACHINE LEARNING AND APPLICATIONS
(2015 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10,***
2) ***Figures to the right 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) Discuss machine learning applications. **[5]**

b) Write short note on Vapnik-Chervonenkis dimension. **[5]**

OR

Q2) a) Explain two methods for reducing dimensionality. **[5]**

b) Write a note on Multiclass classification. **[5]**

Q3) a) Elaborate Bias Variance dilemma. **[5]**

b) Explain overfitting and underfitting? **[5]**

OR

Q4) a) What is multiple linear regression? **[5]**

b) What are the support vectors and margins? Explain soft SVM and hard SVM. **[5]**

Q5) a) Consider following 8 points P1 = [0.1, 0.6], P2 = [0.15, 0.71], P3 = [0.08, 0.9], P4 = [0.16, 0.85], P5 = [0.2, 0.3], P6 = [0.25, 0.5], P7 = [0.24, 0.1], P8 = [0.3, 0.2]. Apply K-Means clustering with initial centroids m1 & m2 where m1 = P1, m2 = P8 and clusters are C1 & C2. Which cluster point P6 belongs to? **[10]**

P.T.O.

b) Define and explain Minority Class, Gini Index, Entropy. **[6]**

OR

Q6) a) Explain feature tree & comment on best split algorithm. **[8]**

b) Consider following splits having four features:

Length = [3, 4, 5] [2+, 0–] [1+, 3–] [2+, 2–]

Gills = [Yes, No], [0+, 4–] [5+, 1–]

Beak = [Yes, No], [5+, 3–] [0+, 2–]

Teeth = [many, few] [3+,4–] [2+, 1–]

Find Total weighted Entropy & Gini-index of all Features. **[8]**

Q7) a) Define and explain Burnoulli's Distribution and Binomial Distribution. **[8]**

b) Explain Bayes Rule & Naive Bayes Classifier. **[8]**

OR

Q8) a) Explain Probabilistic Models with Hidden variables: **[8]**

b) Explain Conditional Probability, Joint Probability, Probability Density Function. **[8]**

Q9) a) What is Deep Learning and how it is different from Machine Learning? **[10]**

b) What is ensemble learning? Explain bagging and boosting. **[8]**

OR

Q10) a) Explain Linear Perceptron as Neurons. **[10]**

b) Write a note on Sigmoid, Tanh and ReLU Neurons. **[8]**

Total No. of Questions : 9]

SEAT No. :

P202

[Total No. of Pages : 2

[5871]-726
B.E. (Information Technology)
SOFTWARE DESIGN & MODELING
(2015 Pattern) (Semester - I) (414455)

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

Q1) a) Write a formal description for money deposit operation use case for ATM system. **[6]**

b) Draw and elaborate on 4 + 1 view architecture of UML. **[4]**

OR

Q2) a) Draw a sequence diagram for online shopping system. **[6]**

b) Explain macro development process used in Booch methodology. **[4]**

Q3) a) Explain concurrent sub-states with suitable examples. **[4]**

b) Draw an activity diagram for servicing of a vehicle in any company operated service center. **[6]**

OR

Q4) a) Explain following concepts related to state diagram with a suitable scenario **[4]**

i) Trigger and ports

ii) Sub - machine states

b) Use CRC approach for drawing a class diagram for a Hostel management system. **[6]**

Q5) a) Explain the design process of access layer classes with flow charts assuming suitable application. **[8]**

b) Draw and explain deployment diagram for a Flight Reservation System. **[8]**

OR

P.T.O.

Q6) a) What is OCL? Explain syntaxes for pre and post conditions with suitable examples. **[8]**

b) Explain the Macro - level process of identification of view layer classes by analyzing use cases by using suitable example. **[8]**

Q7) a) Explain Strategy and State patterns with suitable examples. **[8]**

b) Describe Introduction and Information Expert pattern with suitable examples. **[8]**

OR

Q8) a) Elaborate on Pure Fabrication pattern and Protected Variation pattern with suitable examples. **[8]**

b) Write a note on usage of following patterns : **[8]**

i) Singleton pattern

ii) Adapter pattern

Q9) Write short notes on :

a) Software product line architecture. **[6]**

b) Real time software architecture. **[6]**

c) Component based software architecture. **[6]**

Total No. of Questions : 10]

SEAT No. :

P203

[Total No. of Pages : 2

[5871]-727
B.E. (Information Technology)
WIRELESS COMMUNICATIONS
(2015 Pattern) (Semester - I) (414456A) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain with a neat diagram the Bluetooth Protocol Stack. **[5]**

b) Describe the capacity of a non-fading channel for information transmitted from a wireless system. **[5]**

OR

Q2) a) Compare 2nd Generation and 3rd Generation wireless networks. **[5]**

b) Illustrate how you would apply frequency reuse technique. **[5]**

Q3) a) Compare small scale fading based on multi path time delay and Doppler spread. **[5]**

b) Explain Microcell Zone Concept. **[5]**

OR

Q4) a) Explain Rayleigh and Rician distribution. **[5]**

b) What do you mean by path loss model? Explain in detail about log-distance path loss model. **[5]**

Q5) a) Explain in detail TDMA. **[8]**

b) Explain frequency hopping and direct sequence spread spectrum techniques. **[8]**

OR

P.T.O.

Q6) a) List and describe the features of various multiple access technique used in wireless communication. **[8]**

b) Differentiate between Linearly Amplified BPSK, DQPS and DQPSK. **[8]**

Q7) a) Explain the reverse traffic generation in CDMA. **[8]**

b) With help of neat block diagram, explain different protocols used in GSM Signaling. **[8]**

OR

Q8) a) Describe GSM ciphering mode setting operation and IMEI check. **[8]**

b) Explain the generation of CDMA paging channel. **[8]**

Q9) a) Explain with suitable diagram independent basic service set networks and distribution system concept supported by IEEE 802. 11 architecture. **[8]**

b) Write short note on **[10]**

i) Software Defined Radio,

ii) WiMAX

OR

Q10)a) List and Explain the Security issues and challenges faced in wireless networks. **[8]**

b) Write short note on **[10]**

i) Zigbee Networks,

ii) Ultra-Wideband Radio.

Total No. of Questions : 10]

SEAT No. :

P204

[Total No. of Pages : 2

[5871]-728
B.E. (Information Technology)
NATURAL LANGUAGE PROCESSING
(2015 Pattern) (Semester - I) (Elective-I) (414456B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain how sentences and text are represented in understanding of natural language processing. **[5]**

b) Write a short note on adjective Phrases and Adverbial Phrases. **[5]**

OR

Q2) a) Explain Bottom up chart Parser. **[5]**

b) Explain Morphological Processing in detail. **[5]**

Q3) a) Explain minimal attachment principle with reference to human parsing. **[5]**

b) Explain techniques for Efficient Encoding of Ambiguity. **[5]**

OR

Q4) a) Explain the structure of relative clauses? **[5]**

b) What do you mean by feature structure? Explain with example. **[5]**

Q5) a) Why do you think that the issue of ambiguity is the biggest challenge in NLP? **[8]**

b) How to handle wh-Questions. Explain prepositional phrase wh-Questions. **[8]**

OR

P.T.O.

Q6) a) Wrote a note on "Probabilistic Context - Free Grammars" **[8]**

b) Explain verbs and states in logical form. Give example to justify. **[8]**

Q7) a) Explain Semantic Interpretation and Compositionality. **[8]**

b) Explain how statistical methods can be used for word sense disambiguation. **[8]**

OR

Q8) a) Explain collections and mutual information using examples. **[8]**

b) Describe in detail the lexicon with semantic interpretation. Give example. **[8]**

Q9) a) Explain in detail automating deduction in logic-based representation. **[6]**

b) Describe with example the method for matching possible interpretations to expectations. **[6]**

c) Write a short note on "Hybrid knowledge Representation" **[6]**

OR

Q10) a) What are the different properties of aspectual classes? **[9]**

b) Explain how knowledge representation systems attempt to gain the advantages of using efficient procedural inference for some tasks while retaining theoretical framework of theorem-proving systems. **[9]**

Total No. of Questions : 10]

SEAT No. :

P205

[Total No. of Pages : 2

[5871]-729
B.E. (Information Technology)
USABILITY ENGINEERING
(2015 Pattern) (Semester - I) (414456C) (Elective-I)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Define usability and explain it's attributes. **[6]**

b) How follow up studies are benefited for future interface. **[4]**

OR

Q2) a) Explain Next generation interfaces with example. **[6]**

b) How interfaces are helpful to reduce memory loud. **[4]**

Q3) a) Explain analysis of Financial Impact of the usability in user interface. **[6]**

b) Explain with example the importance of accelerators in user interface. **[4]**

OR

Q4) a) Explain Good error messages with example. **[6]**

b) Write a short note on : Meta - Methods. **[4]**

Q5) a) Explain working of usability Laboratory with diagram. **[10]**

b) Explain the importance of user satisfaction questionnaire for interface testing. **[8]**

OR

P.T.O.

Q6) a) Explain any two usability assessment methods beyond testing. **[10]**

b) What is the role of Focus groups in usability testing. **[8]**

Q7) a) Explain with example International and National standard for interfaces. **[8]**

b) How user and vendor benifits from consistency and standards. **[8]**

OR

Q8) a) How multi-locale interfaces developed. **[8]**

b) Describe guide lines for internationalization of usability interfaces. **[8]**

Q9) a) Describe Intelligent user interfaces with example. **[8]**

b) Explain CAUSE tools with example. **[8]**

OR

Q10) Write a short note on (Any two) **[16]**

a) Virtual Reality.

b) Technology transfer.

c) GOMS Model.

Total No. of Questions : 10]

SEAT No. :

P206

[Total No. of Pages : 2

[5871]-730
B.E. (Information Technology)
MULTICORE AND CONCURRENT SYSTEMS
(2015 Pattern) (Semester - I) (Elective - I) (414456D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What does security architecture mean? Explain operation models. **[5]**

b) Explain Master - worker, Map-reduce program structure pattern. **[5]**

OR

Q2) a) What is Intrusion Detection System with its challenges and limitations. **[5]**

b) Explain the decomposition techniques for achieving concurrency. **[5]**

Q3) a) Differentiate between Static and dynamic thread management? **[5]**

b) Explain PCAM methodologies in details? **[5]**

OR

Q4) a) Explain Fork/Join, loop parallelism program structure patterns. **[5]**

b) What are the classical problems of synchronization and Explain any one in detail. **[5]**

Q5) a) Explain the task directive with example program used in task parallelism in Open MP. **[8]**

b) Explain Open MP integration for manual partitioning. **[8]**

OR

P.T.O.

Q6) a) Explain any four open MP synchronization directives used for mutual exclusion. **[8]**

b) Explain manual partitioning without a race condition. **[8]**

Q7) a) Explain RMA communication functions with correct syntax. **[8]**

b) Explain one sided communication model with the help of diagram. **[8]**

OR

Q8) a) Write a program for parallel implementation of bucket sort in MPI using collective communications. **[8]**

b) Describe any two communication models used for MPI. **[8]**

Q9) a) Explain CUDA's program execution model with diagram. **[8]**

b) Write short on **[10]**

i) Debugging CUDA Program

ii) Proiling CUDA Program

OR

Q10)a) Explain in detail GPU memory hierarchy with neat diagram. **[8]**

b) Write short note on CUDAs Optimization techniques. **[6]**

c) Differentiate between CUDA and MPI. **[4]**

Total No. of Questions : 10]

SEAT No. :

P207

[Total No. of Pages : 2

[5871]-731

B.E. (Information Technology)
BUSINESS ANALYTICS & INTELLIGENCE
(2015 Pattern) (Semester - I) (Elective - I) (414456E)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) List relation of BI with DSS. **[5]**

b) Enlist types of OLAP Architecture. **[5]**

OR

Q2) a) Discuss various major organizational obstacles to BI project. **[5]**

b) Discuss the role of computerized support for decision making and its importance. **[5]**

Q3) a) Explain top job responsibilities of BI analytics for creating data visualizations and dashboards. **[5]**

b) Write short note on Sybase BI platform. **[5]**

OR

Q4) a) Explain OLAP operations with the help of examples. **[5]**

b) Write short note on Basic and Composite charts. **[5]**

Q5) a) Enlist and explain the activities of BPM. **[10]**

b) Discuss key performance indicators for their performance management system. **[6]**

OR

P.T.O.

Q6) a) Explain the phases of BPM cycle. **[10]**

b) Differentiate between dashboards and scorecards. **[6]**

Q7) a) Discuss different stages of Business analytics life cycle. With neat diagram. **[10]**

b) What are the advantages of BI in ERP? **[8]**

OR

Q8) a) Discuss the role of Visual Analytics in BI? **[8]**

b) Explain the role of BI in Banking with an example. **[10]**

Q9) a) Discuss different levels of BI maturity. **[8]**

b) Explain the use of Open Source BI. **[8]**

OR

Q10)a) Explain the factors that impact BI maturity within an organization in details. **[10]**

b) Write short note on "Big Data". **[6]**

Total No. of Questions : 10]

SEAT No. :

P208

[Total No. of Pages : 2

[5871] - 732
B.E. (Information Technology)
SOFTWARE DEFINED NETWORKS
(2015 Pattern) (Semester - I) (414457A) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) What is network virtualization? Explain its benefits. **[6]**

b) List & explain fundamental characteristics of SDN. **[4]**

OR

Q2) a) Explain in brief VMware. **[6]**

b) Explain concept of Naos. **[4]**

Q3) a) Draw & explain architecture diagram of a modern data center. **[6]**

b) Explain the need of SDN. **[4]**

OR

Q4) a) Draw & explain open flow architecture. **[6]**

b) Discuss advantages & limitations of Open flow architecture. **[4]**

Q5) a) What is open day light protocol? **[8]**

b) Explain flood light project. **[8]**

OR

Q6) a) Differentiate between data plane & control plane. **[8]**

b) Explain the concept of programnable controller. **[8]**

Q7) a) Elaborate on southbound API. **[8]**

b) Compare NFV vs NV. **[8]**

OR

P.T.O.

Q8) a) What is the difference between software based & hardware based networks? **[8]**

b) Explain Northbound API. **[8]**

Q9) a) List & explain various network topologies. **[10]**

b) Draw & explain architecture diagram of optical networks. **[8]**

OR

Q10)a) Explain various SDN controllers. **[10]**

b) What is firewall? How firewall can be implemented by using SDN? **[8]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P209

[Total No. of Pages : 2

[5871] - 733
B.E. (I.T.)
SOFT COMPUTING
(2015 Pattern) (Semester - I) (Elective - II) (414457B)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain how Artificial Neuron model is based on Biological Neurons with suitable diagram. **[5]**

b) Define soft computing. Differentiate between Hard and Soft Computing. **[5]**

OR

Q2) a) Explain the Neural computing with suitable diagram. **[5]**

b) Differentiate between Evolutionary Computing and Genetic Algorithms with eg. **[5]**

Q3) a) Explain Deep Learning Architecture with suitable diagram. **[5]**

b) Define Perceptron. What are the various limitations in learning perceptron model. **[5]**

OR

Q4) Write a short note on following (Any Two). **[10]**

i) Multilayer Feed Forward Networks.

ii) Fuzzy Systems

iii) Hopfield Networks

P.T.O.

Q5) a) Define Fuzzy relations. Explain Fuzzy Equivalence Relation with suitable diagram. **[8]**

b) Explain Crossover and mutation with suitable eg. **[8]**

OR

Q6) a) Explain the process of fuzzification with eg. How it is different from Defuzzification? **[8]**

b) Explain the working of Neuro fuzzy system with suitable diagram. **[8]**

Q7) a) What are fuzzy relations? Explain any two operations of fuzzy relations with suitable examples. **[8]**

b) Explain the concept of Ant Colony Optimization with suitable ex. and diagram. **[8]**

OR

Q8) a) Enlist and Explain in brief types of Genetic Algorithms. **[8]**

b) Explain the working of Genetic Algorithm based back propagation network with suitable diagram. **[8]**

Q9) a) Explain the operation of a simple Genetic Algorithm with a neat flowchart. **[8]**

b) Enlist various operators involved in Genetic Algorithms. Explain any two in detail. **[10]**

OR

Q10)Write Short Notes on following: (Any Three) **[18]**

a) Fuzzy Tolerance Relation.

b) Genetic Programming

c) Fuzzy ART Map

d) Trapezoidal Fuzzy Set

e) Defuzzification

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P210

[Total No. of Pages : 2

[5871] - 734
B.E. (Information Technology)
SOFTWARE TESTING & QUALITY ASSURANCE
(2015 Pattern) (Semester - I) (Elective - II) (414457C)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Anwer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Write the role of software tester in software development organization. **[5]**

b) What is White Box Testing? **[5]**

OR

Q2) a) Write generic requirements of test tool/framework. **[6]**

b) What is difference between Debugging and Testing? **[4]**

Q3) a) Illustrate scope of Automation in details. **[5]**

b) Write short note on Test case using Black Box Approach. **[5]**

OR

Q4) a) Explain total quality management. **[4]**

b) Explain Terms - MTTF, MTTR, MTBF. **[6]**

Q5) a) What are the difference between QA & QC? **[8]**

b) Define SQA and SQA component's in details. **[8]**

OR

Q6) a) Compare verification and validation in details. **[8]**

b) Explain 7 basic Tools of software quality. **[8]**

P.T.O.

Q7) a) Explain the Five maturity levels in the CMMI model. **[8]**

b) What is an "Ishikawa" diagram? When should it be used? **[8]**

OR

Q8) a) Explain the model for process management. What are its uses? **[8]**

b) My organization provides services. How are the ISO 9000 standards applicable to us? **[8]**

Q9) a) What is Refactoring? Explain in details. **[8]**

b) Write short notes on:- **[10]**

i) Defect Removal Techniques.

ii) Defect Prevention Techniques.

OR

Q10)a) Explain the detail walk through as a type formal technical review. **[8]**

b) Explain Computer Aided Software Engineering (CASE) & the various types of CASE tools. **[10]**

♦ ♦ ♦

Total No. of Questions : 10]

SEAT No. :

P211

[Total No. of Pages : 2

[5871] - 735
B.E. (Information Technology)
COMPILER CONSTRUCTION
(2015 Pattern) (Semester - I) (Elective - II) (414457D)

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 and support your answer with and examples wherever ncessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) What is the need of symbol table? Explain. **[5]**

b) What do you mean by left factoring? Explain with example. **[5]**

OR

Q2) a) Explain Error recovery. **[5]**

b) Explain Algorithms FIRST and FOLLOW to construct Predictive Parsing Table. **[5]**

Q3) a) Explain the concept of lazy evaluation. **[5]**

b) What are immutable variables? Explain. **[5]**

OR

Q4) a) Explain mechanism of tail recursion. **[5]**

b) Explain the concept of lazy evaluation. **[5]**

Q5) a) Discuss mechanisms for speeding up data flow analysis. **[9]**

b) What do you mean by polymorphic? Explain Parametric polymorphism and Overloading. **[7]**

OR

Q6) a) How can the machine code deal with different types and sizes of data? **[8]**

b) What do you mean by Static overloading? How it differs from dynamic overloading? **[8]**

P.T.O.

Q7) a) What is mean by Loop Optimization? Explain different kinds of Loop Optimization Techniques. **[8]**

b) What are the different Optimization algorithms using Static Single Assignment (SSA)? Explain any one in detail. **[9]**

OR

Q8) a) What is procedure to convert program into Static Single Assignment (SSA) Form? **[8]**

b) Write a Short Note on: **[9]**

i) Dominators

ii) Induction Variables

iii) Loop Unrolling

iv) Loop invariant computations

Q9) a) Explain Aiken-Nicolau loop pipelining algorithm. **[8]**

b) What is prefetching? Explain with suitable example. **[9]**

OR

Q10)a) Explain the technique of Blocking with an example. **[8]**

b) "Garbage-collector is really a kind of memory manager." Justify this statement. **[9]**

Total No. of Questions : 10]

SEAT No. :

P212

[Total No. of Pages : 2

[5871] - 736
B.E. (Information Technology)
GAMIFICATION
(2015 Pattern) (Semeser - I) (Elective-II) (414457E)

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

Instructions to the candidates:

1) ***Anwer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Neat diagrams must be drawn wherever ncessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Explain role of replaying history in Gamification. **[5]**

b) Write a note on Gamification and the Life of Things. **[5]**

OR

Q2) a) What are the concepts applied to video games and Gamification? **[5]**

b) Write a note on: The Theory of Playing by Jacques Henriot. **[5]**

Q3) a) Compare playful versus playable with respect to remodeling design. **[6]**

b) Explain Context and Re-Setting behaviour in Gamification. **[4]**

OR

Q4) a) Explain Game Mechanics for opponent moves in Gamification. **[4]**

b) List out any 4 best practices of gamification. Describe any one of them. **[6]**

Q5) a) What is the difference between game mechanics and game dynamics? Explain with example. **[9]**

b) Explain agile game development process with example. **[9]**

OR

Q6) a) Explain 8 queen's problem as a case study for game design in gamification. **[9]**

b) Describe how pattern recognition and collecting game mechanics can be useful for gamified system. **[9]**

P.T.O.

Q7) a) List the factor required developing any game. Discuss any one of the factor. **[8]**

b) Explain how the development of gamification have been influenced by cloud computing. **[8]**

OR

Q8) a) How Yahoo! Answer is useful for asking and answering one another's questions? **[8]**

b) Justify: Gamification: Applications for health promotion and health information technology engagement. **[8]**

Q9) a) How Bigdoor platform can be used to develop Loyalty program? **[8]**

b) How App Gamification Boosts Engagement in gamification? **[8]**

OR

Q10)a) Explain gamification **app Foursquare** in detail. **[8]**

b) Explain useful features of mambo. How mambo platform can be used for e-learning activity? **[8]**

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Total No. of Questions : 10]

SEAT No. :

P92

[Total No. of Pages : 2

[5871]-737

B.E. (Information Technology)

DISTRIBUTED COMPUTING SYSTEM

(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain in brief key techniques used for indirect communication in Distributed system. **[5]**

b) What are various forms of transparency in distributed system? Illustrate network transparency with an example. **[5]**

OR

Q2) a) What is group communication? Discuss IP multicast w.r.t. following : **[5]**

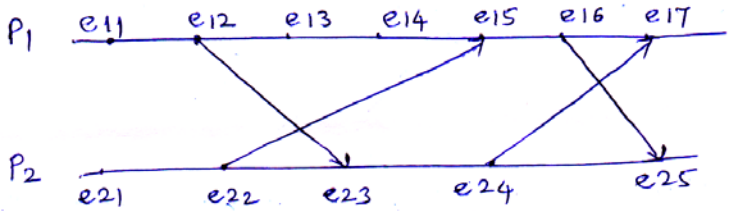
i) Multicast Routers

ii) Multicast address allocation

b) Describe how connectionless communication between a client and a server proceeds when using sockets. **[5]**

Q3) a) Explain the central server algorithm and evaluate the performance of this algorithm for mutual exclusion. **[6]**

b) Compute Lamport's clock's logical event ordering for the following scenario: **[4]**



OR

P.T.O.

Q4) a) Distinguish between caching and replication. **[4]**

b) Using finite state diagrams for the coordinator and the participant, describe the two-phase commit protocol. **[6]**

Q5) a) List the different distributed file system requirements. Explain the abstract file service architectural model with neat diagram. **[8]**

b) Explain the principal design feature of Bittorrent file sharing application, and explain in detail how Bittorrent protocol operates. **[8]**

OR

Q6) a) What is meant by Directory Services? What are Directory service operations. **[8]**

b) Discuss Domain Name System with it's components like DNS queries, DNS name server. **[8]**

Q7) a) Describe diagrammatically the general organization of the Apache Web server. **[8]**

b) What are web server clusters? Explain the content - aware cluster of web Servers with a neat diagram. **[8]**

OR

Q8) a) Give the disadvantage of using Hierarchical caches for a web proxy. How can it be overcome through cooperative caching? **[8]**

b) Why web services are used? Explain SOAP and REST based web services. **[8]**

Q9) a) List out the various security threats in a distributed system. Elaborate on the various policies and security mechanisms in distributed systems. **[9]**

b) Describe KERBEROS authentication system architecture with neat diagram. Explain why KERBEROS is not complete security solution. **[9]**

OR

Q10) a) Explain the concept of Grid.Explain in brief, the requirements of Grid applications. Distinguish between Grid and Coloud computing. **[9]**

b) What is meant by Public key cryptography? Explain Digital signatures with public keys. **[9]**

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Total No. of Questions : 10]

SEAT No. :

P213

[Total No. of Pages : 2

[5871]-738
B.E. (Information Technology)
UBIQUITOUS COMPUTING
(2015 Pattern) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Describe the UbiCom System Model and SMART DEI Model? **[5]**

b) List and explain three Main Types of Environment Context? **[5]**

OR

Q2) a) Explain the process of Ubiquitous system Environment Interaction? **[5]**

b) List and explain five core properties that characterize UbiCom System? **[5]**

Q3) a) Explain the concept of Virtual Machines? **[5]**

b) Explain RFID tags and Its Types? **[5]**

OR

Q4) a) What is MEMS? **[5]**

b) Explain the properties of Ubiquitous Computing? **[5]**

Q5) a) Classify all handling limited key input and explain it in detail? **[8]**

b) Write short note on : i) Organic Interface ii) Tangible Interface **[8]**

OR

Q6) a) What is Virtual reality and Augmented reality? **[8]**

b) Describe human entered design lifecycle in detail with diagram? **[8]**

P.T.O.

Q7) a) Describe privacy difficulties of RFID tags? **[8]**

b) Explain solov's taxonomy of privacy with diagram? **[8]**

OR

Q8) a) Explain possible ways of addressing privacy in ubiquitous computing? **[8]**

b) Explain Communication Confidentiality and Anti-Collision Protocol? **[8]**

Q9) a) Describe wireless data network with its types? **[8]**

b) Explain with example Personal Area Network and Body Area Network? **[10]**

OR

Q10)a) Explain Configuration and Security Management in UbiComp? **[8]**

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

i) Bluetooth

ii) ZigBee

Total No. of Questions : 10]

SEAT No. :

P214

[Total No. of Pages : 2

[5871]-739

B.E. (Information Technology)

INTERNET OF THINGS (IoT)

(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

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

Q1) a) What is Internet of Things (Iot)? What are components required to design IoT Device and which device we call IoT device? Explain with an example. **[5]**

b) Explain in detail IoT architecture with neat diagram. **[5]**

OR

Q2) a) Write short notes on IoT Enabling Technologies: WSN & Cloud Computing. **[5]**

b) Explain the IoT Data Management and Compute Stack with Fog Computing & Edge Computing. **[5]**

Q3) a) Write short notes on : **[5]**

i) IoT protocol stack

ii) The Core IoT Functional Stack

b) Differentiate between **[5]**

i) IoT and M2M

ii) SDN and NFV

OR

Q4) a) Explain the Hierarchy of Edge Computing; Fog Computing and Cloud IoT. **[5]**

b) Explain the IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and 802.15.4e. **[5]**

P.T.O.

Q5) a) Explain the addressing techniques for the IoT. **[8]**

b) Write short notes on **[8]**

i) Quality of Service in IPv6

ii) Migration Strategies to IPv6

OR

Q6) Write short notes on : **[8]**

a) i) IPv6 Tunneling

ii) IPsec in IPv6

b) Explain the Mobile IPv6 technologies for the IoT. **[8]**

Q7) a) What is an IoT Device? Explain the working of Home Automation IoT device. **[8]**

b) Explain the working and interfaces of Raspberry PI. **[8]**

OR

Q8) a) Explain the working of following IoT devices : **[8]**

i) pcDuino

ii) Beagle bone Black

b) Explain the working of following IoT devices : **[8]**

i) CubieBoard

ii) ARDUINO

Q9) a) Explain the Cloud storage models and communication API's. **[9]**

b) Explain the Python web application framework. **[9]**

OR

Q10) Write short notes on : **[9]**

a) i) Designing a RESTful web API

ii) AMAZON web services for IoT

b) Write short notes on **[9]**

i) SkyNet IoT messaging platform.

ii) IoT case studies : Home Automation

Total No. of Questions : 10]

SEAT No. : ____

P215

[Total No. of Pages : 2

[5871]-740
B.E. (Information Technology)
INFORMATION STORAGE AND RETRIEVAL
(2015 Pattern) (Semester - II) (Elective - III)

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) ***Assume suitable data, if necessary and mention it clearly.***

Q1) a) Explain steps in conflation algorithm using a suitable example. **[6]**

b) Draw and Explain IR system block diagram. **[4]**

OR

Q2) a) Differentiate between data retrieval and information retrieval. **[6]**

b) Explain the terms Harmonic mean, E measure. **[4]**

Q3) a) Explain single pass algorithm with example. **[6]**

b) Define and explain following terms - Precision & Recall. **[4]**

OR

Q4) a) Compare Neural network-based retrieval and Fuzzy set retrieval methods. **[6]**

b) Define and Explain following terms i) MRR ii) NDCG **[4]**

Q5) a) Describe the architecture of distributed IR. **[9]**

b) What do you understand by multimedia query language? Explain various query predictors. **[9]**

OR

P.T.O.

Q6) a) Describe multimedia data support in commercial DBMS. **[9]**

b) What do you mean by source selection and collection partition in distributed IR? **[9]**

Q7) a) Explain centralized and distributed architecture of a search engine. **[8]**

b) What is page ranking? Explain with example how to calculate page rank of web page. **[8]**

OR

Q8) a) Discuss challenges involved in web searching. **[8]**

b) Write short note on web data mining. **[8]**

Q9) a) Write a note on "Ontology languages for semantic web". **[8]**

b) Define Recommender system? Explain in brief collaborative filtering. **[8]**

OR

Q10)a) What is collaborative filtering? Discuss its advantages and disadvantages. **[8]**

b) Explain the methods for extracting data from text. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P216

[Total No. of Pages : 2

[5871]-741
B.E. (Information Technology)
MULTIMEDIA TECHNIQUES
(2015 Pattern) (Semester - II) (Elective - III)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, 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.***
5) ***Use of calculator is allowed.***

Q1) a) State and Explain goals, objectives and characteristics of multimedia. **[5]**

b) Explain image processing cycle. **[5]**

OR

Q2) a) Brief the multimedia application in e-learning and education. **[5]**

b) What is Lossy and Lossless compression? **[5]**

Q3) a) Explain video transmission standards. **[5]**

b) Explain different video file formats. **[5]**

OR

Q4) a) What are characteristics of sound waves? **[5]**

b) Explain WAV, AIFF, VOC, AVI audio file formats. **[5]**

Q5) a) Explain different types of animation. **[8]**

b) What are the different methods of controlling the animation? **[8]**

OR

P.T.O.

Q6) a) Write different important virtual reality applications. **[8]**

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

Q7) a) Explain the basics of illumination and shading models. **[8]**

b) How transparency make effectiveness in rendering? **[8]**

OR

Q8) a) What is ray tracing and explain different types? **[8]**

b) Explain Spatial partitioning and Solid Modeling. **[8]**

Q9) a) Explain different types of multimedia communication networks? **[9]**

b) Write importance of multimedia in game design. **[9]**

OR

Q10)a) Explain Mobile Gaming and Cloud Gaming. **[9]**

b) Write short note on Android Multimedia Framework Architecture. **[9]**

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

P217 **[Total No. of Pages : 2**

[5871]-742

B.E. (Information Technology)

INTERNET AND WEB PROGRAMMING

(Elective - III) (2015 Pattern) (Semester - II) (414464 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) ***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 do you mean JavaScript? What are data types in JavaScript? **[6]**

b) Specify ways to place JavaScript in the HTML Code. **[4]**

OR

Q2) a) Explain GET and POST method variable in PHP. **[6]**

b) List and explain CSS Selector with example. **[4]**

Q3) a) How to create array in java script? Explain with example. **[6]**

b) How to embed audio and video tag in HTML5 explain with example? **[4]**

OR

Q4) a) What is AngularJS. Explain advantages and disadvantages of AngularJS. **[6]**

b) Differentiate between session and cookies. **[4]**

Q5) a) What is Java Server Faces (JSF) Technology. Explain steps to create a simple JSF Application. **[8]**

b) What is a web service? Give an example. Explain the features of web service. **[8]**

OR

P.T.O.

Q6) a) What is Universal Description Discovery Integration (UDDI). Explain UDDI and its Structure in detail. **[8]**

b) What is loop in WordPress and how it works? Explain with an example. **[8]**

Q7) a) Explain how to write headers and footers in jQuery Mobile. **[8]**

b) What do you mean by jQuery Mobile? Explain how to add multiple pages to one file in jQuery Mobile. **[8]**

OR

Q8) a) What is jQuery Mobile? How to implement jQuery mobile. **[8]**

b) List and explain limitations of Mobile Web? **[8]**

Q9) a) What are the most important steps you would recommend for securing a new web server and web application? **[6]**

b) Differentiate user level security with server level security. **[6]**

c) List and explain the methods used to make information on the web more secure? **[6]**

OR

Q10)a) What is SQL Injection. How to mitigate the SQL Injection risks? **[6]**

b) List and explain the common threats on Web? **[6]**

c) "I thought my hosting provider protects my site". Explain why should I pay for website security when I already pay for hosting? **[6]**

Total No. of Questions : 10]

SEAT No. :

P218

[Total No. of Pages : 4

[5871]-743

B.E. (Information Technology)

COMPUTATIONAL OPTIMIZATION

(2015 Pattern) (Semester - II) (Elective - III)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

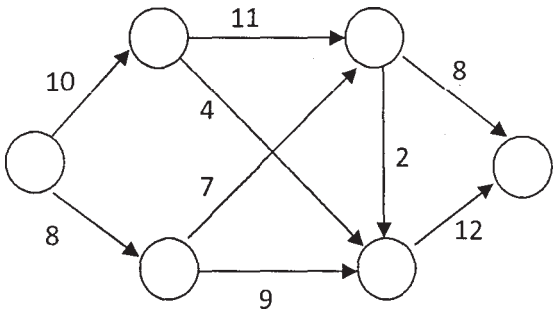
1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q.9 or Q.10.***
2) ***Assume suitable data if necessary.***
3) ***Neat diagrams and assume suitalbe data wherever necessary.***
4) ***Figures to the right side indicate full marks.***

Q1) a) A plant manufactures 2 products X and Y. The profit contribution of each product has been estimated as Rs. 50 for product A and Rs. 60 for product B. Each product passes through 4 departments of the plant. The time required for each product and total time available in each department are as follows : **[5]**

Department	Hours Required		Available hours during the month
	Product X	Product Y	
1	2	3	800
2	3	2	1000
3	1	1	700
4	3	4	500

The company has a contract to supply at least 380 units of product B per month. Formulate the problem as L.P.P

b) Determine the Max Flow using the Ford Fulkerson's Algorithm. **[5]**



OR

P.T.O.

Q2) a) The utility data for a network are given below. Determine the total float and identify the critical path. **[5]**

Activity :	1-2	1-4	1-7	2-3	3-6	4-5	4-8	5-6	6-9	7-8	8-9	9-10
Duration:	3	2	2	5	2	6	8	5	4	4	6	3

b) Explain types of Inventories. **[5]**

Q3) a) A wholesaler supplies 30 stuffed dolls each weekday to various shops. **[5]** Dolls are purchased from the manufacturer in lots of 120 each of Rs. 1200 per lot. Every order incurs a handling charge of Rs. 60 plus a freight charge of Rs. 250 per lot. Multiple and fractional lots can also be ordered, and all orders are filled the next day. The incremental cost is Rs. 0.60 per year to store a doll in inventory. The wholesaler finances the inventory investments by paying its holding company 2% monthly for borrowed funds. Find EOQ and frequency of orders assuming 250 weekdays in a year.

b) Solve using Graphical Method **[5]**

Maximize $Z = 3X_1 + 4X_2$ subject to the constraints

$3X_1 + 5X_2 \leq 30$,

$2X_1 + 2X_2 \leq 20$ and $X_1, X_2 \geq 0$

OR

Q4) a) Tasks A to I constitute a project. The precedence relationships are : **[5]**
A < D; A < E; B < F; D < F; C < G; C < H; F < 1; G < l.
Draw a network to represent the project and find the minimum time to complete the project when time, in days, of each task is as follows:

Task :	A	B	C	D	E	F	G	H	I
Time :	8	10	17	10	16	8	18	14	9

Also identify the critical Path

b) Determine the initial basic feasible solution to the following transportation problem using least cost method. **[5]**

		Destination				
		D1	D2	D3	D4	Availability
Origin	O1	1	2	1	4	20
	O2	3	3	2	1	40
	O3	4	2	5	9	20
	O4	5	3	6	10	20
Requirement		20	40	30	10	

Q5) a) Solve by principle of dominance : **[8]**

	A1	A2	A3	A4
B1	6	8	3	13
B2	4	1	5	3
B3	8	10	4	12
B4	3	6	7	12

b) Write short note on applications of Game Theory. Write any four limitations of Game Theory. **[8]**

OR

Q6) a) Solve the following Game using graphical method : **[8]**

B

A	$x_2 = 1 - x_1$ (over x_1)	y_1	y_2	y_3
		6	6	6
		4	12	2

b) Determine Optimum Strategies and Value of Game. **[8]**

	B1	B2	B3	B4	B5
A1	3	–1	4	6	7
A2	–1	8	2	4	12
A3	16	8	6	14	12
A4	1	11	–4	2	1

Q7) a) A television repairman finds that the time spent on his jobs has an exponential distribution with mean of 20 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets follows a Poisson distribution approximately with an average rate of 8 per 8-hour day, what is the repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? **[8]**

b) A Saree Emporium has a single cashier. During the rush hours, customers arrive at the rate of 10 per hour. The average number of customers that can be processed by the cashier is 15 per hour. On the basis of this information, find the following : **[10]**

i. Probability that the cashier is idle

ii. Average number of customers in the queuing system

iii. Average time a customer spends in the system

iv. Average number of customers in the queue

v. Average time a customer spends in the queue

OR

Q8) a) Explain the following **[8]**

i. Arrival Pattern

ii. Service Disciplines

iii. Service Channel

iv. Service Distribution

b) In a bank, 20 customers on the average are served by a cashier in an hour. If the service time has exponential distribution, what is the probability that **[10]**

i. It will take more than 10 minutes to serve a customer?

ii. A customer shall be free within 4 minutes?

Q9) a) What do you mean by constrained optimization? **[8]**

b) Describe Simple Genetic Algorithm with a flowchart and a suitable example. **[8]**

OR

Q10)a) Write short note on Gradient Descent procedure of Machine Learning Optimization. **[8]**

b) Describe Ant colony optimization. Furthermore, describe the effect of colony size in ACO. **[8]**

Total No. of Questions : 10]

SEAT No. :

P219

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[5871]-744

B.E. (Information Technology)

RURAL TECHNOLOGIES AND COMMUNITY DEVELOPMENT

(2015 Pattern) (Elective - IV) (Semester - II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q2, 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) ***Assume suitable data if necessary.***

Q1) a) What do you mean by rural development? What are the objectives of rural development? **[6]**

b) Illustrate with example the concept of rural development as a process, as a phenomenon, as a strategy, and as a discipline. **[4]**

OR

Q2) a) Explain the Big push theory by Rodan as essential to achieve the economic development. **[6]**

b) Define GDP (Gross Domestic product)? What are the 4 parts of GDP. **[4]**

Q3) a) Explain with diagram Loren Curve for measuring income distribution? **[6]**

b) Is the Gandhian Concept of Rural Development applicable in today's rural villages? **[4]**

OR

Q4) a) Explain any two natural resources? What are the advantages of using natural sources of energy? **[6]**

b) What are the advantages of the drip system in agriculture? **[4]**

Q5) a) Explain key characteristics of community development? Which characteristics are common in your rural place? **[8]**

b) What are the main challenges Community developers you face while developing rural places? **[8]**

OR

P.T.O.

Q6) a) What are the benefits of community development? **[8]**

b) Why community participation is important? What are the steps to build community participation? **[8]**

Q7) a) Explain Integrated product and process development with advantages. What steps are required to launch a product in the market? **[9]**

b) Explain in brief different types of financial institutions. Which one is the best among all? **[9]**

OR

Q8) a) Explain Partnerships with advantages & disadvantages. Explain with an example? **[9]**

b) What is the difference between debit and credit financing. **[9]**

Q9) a) After visiting your own village what technologies have you can implement to make it a smart village? **[8]**

b) How can you help your own village with water conservation? **[8]**

OR

Q10) a) Which place have you visited for watershed management?What was the problem earlier villagers faced? What did you analyze about the water storage plan in that village? **[8]**

b) What are the parameters required to make a Model Village? **[8]**

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

P220 **[Total No. of Pages : 2**

[5871]-745
B.E. (Information Technology)
PARALLEL COMPUTING
(2015 Pattern) (Semester - II) (Elective - IV)

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

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, 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) Why do we need parallel and distributed computing? **[6]**

b) What are the four types of parallel computing? **[4]**

OR

Q2) a) Explain in detail 1) ILP 2) TLP. **[5]**

b) Explain in detail message passing mechanism in parallel computing. **[5]**

Q3) a) Explain in detail various Interconnection Networks. **[4]**

b) Explain difference between Multicores and Multiprocessors. **[6]**

OR

Q4) a) What is message passing and shared memory computer architecture? **[5]**

b) Explain in detail types of consistency. **[5]**

Q5) a) What are the features of parallel computing? **[8]**

b) Write short note on optimizing compilers for parallelism. **[8]**

OR

Q6) a) What are the challenges in parallel processing? **[8]**

b) What are the parallel processing techniques? **[8]**

P.T.O.

Q7) a) What are the issues that occur with cache coherence? **[8]**

b) Write short note on Synchronization Issues. **[8]**

OR

Q8) a) Explain in detail. OPENMP Programming. **[8]**

b) Explain in detail OPENMP Execution Model. **[8]**

Q9) a) What are difference memory consistency models? **[5]**

b) Explain in detail any four OPENMP Directives. **[8]**

c) Explain in detail MPI Programming. **[5]**

OR

Q10)a) Write short note on GPU Programming with neat diagram. **[10]**

b) Explain in detail CUDA Threads and Memories. **[8]**

Total No. of Questions : 10]

SEAT No. :

P221

[Total No. of Pages : 2

[5871]-746

B.E. (Information Technology)

COMPUTER VISION

(2015 Pattern) (Semester - II) (Elective - IV) (414465C)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8, Q9 or Q10.***
2) ***Draw neat diagrams and assume suitalbe data wherever necessary.***
3) ***Figures to the right side indicate full marks.***

Q1) a) Explain classical filtering operations. **[6]**

b) What is corner and interest point detection. **[4]**

OR

Q2) a) Explain Object labeling and counting. **[6]**

b) What are the boundary descriptors? **[4]**

Q3) a) Explain mathematical morphology. **[6]**

b) What are the different image processing techniques? **[4]**

OR

Q4) a) Explain active contours. **[6]**

b) Explain Fourier descriptors. **[4]**

Q5) a) What are the different Methods for 3D vision? **[10]**

b) Explain shape from shading. **[8]**

OR

P.T.O.

Q6) a) What is Hough Transform (HT) for line detection? **[10]**

b) Describe ellipse detection. **[8]**

Q7) a) Explain spatial matched filtering. **[8]**

b) What are the RANSAC for straight line detection? **[8]**

OR

Q8) a) Explain projection schemes. **[8]**

b) Describe point-based representation. **[8]**

Q9) a) Explain Applications of Motion Detection and Tracking. **[8]**

b) Explain Single object md multi-object tracking. **[8]**

OR

Q10)a) Explain Eigen faces in detail. **[8]**

b) Describe Chamfer matching and occlusion. **[8]**

Total No. of Questions : 10]

SEAT No. :

P222

[Total No. of Pages : 2

[5871]-747

B.E. (Information Technology)

SOCIAL MEDIA ANALYTICS

(2015 Pattern) (Semester - II) (Elective - IV) (414465D)

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) What is Public and Private data in social media? Give example. **[6]**

b) Explain Node-Link diagram of Structural Visualization. **[4]**

OR

Q2) a) What do you mean by Sampling for Social networks data? What is the need for Sampling? **[6]**

b) How to gather the data from social media? **[4]**

Q3) a) What is Data Mining? Draw and explain Architecture of a typical Data Mining System. **[6]**

b) What is Classification? Explain with diagram. **[4]**

OR

Q4) a) Explain Hierarchical Clustering Algorithm with Single Linkage Clustering. **[6]**

b) Write a note on Text Mining in social networks. **[4]**

Q5) a) What is Centrality? Explain Degree Centrality and Katz Centrality with examples. **[8]**

b) Explain Network Relationship by using Transitivity and Transitivity Linking. **[8]**

OR

P.T.O.

Q6) a) Explain Betweenness Centrality and Closeness Centrality. **[8]**

b) Explain Balance and Status theory using proper examples. **[8]**

Q7) a) What is Collective Behavior Analysis? Explain User Migration in social media. **[8]**

b) What are the Node Neighbourhood-Based methods. **[8]**

OR

Q8) a) Write major components of Behavior Analysis Methodology. **[8]**

b) What is Individual Behavior Modelling? Explain Social Community Structure. **[8]**

Q9) a) What is Facebook? Explore Facebook's Social graph API. **[10]**

b) How would you define Twitter? Explain with different Services. **[8]**

OR

Q10) a) Explain Open Authentication and how it is used in Twitter? **[10]**

b) Explain Fecebook with Analyzing Social Graph Connections. **[8]**

Total No. of Questions : 8]

SEAT No. :

P2316

[Total No. of Pages : 2

[5871]-748
B.E. (AI & ML)
Honors : MACHINE LEARNING
(2015 Pattern) (Semester - I) (410301)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) What is supervised machine learning? Explain it in detail. **[6]**

b) Describe Random Forest algorithm with example. **[8]**

c) Explain the role of machine learning algorithms in following applications. **[6]**

i) Spam filtering

ii) Natural Language Processing

OR

Q2) a) Explain the Lasso, and Ridge types of regression. **[6]**

b) What is Linear Discriminant Analysis? Explain it with suitable example and formulae. **[8]**

c) What is Support Vector Machine? Explain how it works. **[6]**

Q3) a) What is perceptron? Discuss it with suitable diagram. **[8]**

b) What is neural network? Differentiate single layer perceptron with multilayer perceptron? **[5]**

c) Explain Recurrent Networks. **[4]**

OR

Q4) a) Draw and explain multi-layer perception in detail. **[8]**

b) Write short note on : **[9]**

i) Recurrent Networks

ii) Regularization in Neural Networks

P.T.O.

Q5) a) Explain with suitable example K-medoids algorithm. **[9]**

b) Explain following measures used in association rule mining. Also give example of each. **[8]**

i) Support

ii) Confidence

OR

Q6) a) Explain steps of Apriori algorithm. **[6]**

b) Describe Gaussian Mixtures. **[5]**

c) What is cluster analysis? What are the requirements of clustering? **[6]**

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

i) Markov Random Fields

ii) Hidden Markov Model

b) Define Bayes Theorem. Elaborate Naïve Bayes Classifier working with example. **[8]**

OR

Q8) a) What do you mean by linear regression? With suitable example, describe how linear regression is used to predict the output for test example/input sample. **[8]**

b) What is HMM? Explain HMM with suitable diagram. **[8]**

Total No. of Questions : 12]

SEAT No. :

P223

[Total No. of Pages : 2

[5871] - 749

B.E. (2015 Pattern)

HONORS - CYBER SECURITY

Internet of Things and Embedded Security

(Semester - I) (410401)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) What are the risk associated with IoT? **[5]**

b) Explain the different threats in IoT. **[5]**

OR

Q2) a) Describe the counter measures for the different attack in IoT. **[5]**

b) Explain CPS for IoT. **[5]**

Q3) a) Explain security in agile developments with respect to IoT. **[5]**

b) Why does IoT requires a security? **[5]**

OR

Q4) a) Explain : **[5]**

i) Privacy impact assessment

ii) Safety impact assessment

b) What are security issues in IoT? **[5]**

Q5) a) Describe IoT security CONOPS document, Network and security integration. **[8]**

b) Explain data purging. **[5]**

OR

Q6) a) Explain following : **[8]**

i) Security monitoring

ii) Penetration testing

b) Describe attribute-based access control mechanism for IoT. **[5]**

P.T.O.

Q7) a) Describe cryptographic module principals for IoT. **[6]**

b) Enlist and explain the phases of cryptographic key management fundamentals. **[6]**

OR

Q8) a) Describe cryptographic control in Zigbee protocol. **[6]**

b) Explain cryptographic control for IoT protocols. **[6]**

Q9) a) Explain holistic IAM program for IoT. **[6]**

b) Explain IEEE 1609.2. **[6]**

OR

Q10)a) Discuss authorization & access control for IoT. **[6]**

b) Explain identity management & access management for the IoT. **[6]**

Q11)a) Explain the following identity management model **[8]**

i) Local Identity

ii) Federated identity

b) Describe local identity management model for IoT. **[5]**

OR

Q12)a) Explain the following identity management models **[8]**

i) Network identity

ii) Global web identity

b) Describe Identity Portrayal. **[5]**

▽▽▽▽

Total No. of Questions : 8]

SEAT No. :

P224

[Total No. of Pages : 2

[5871]-750
B.E. (Computer Engineering)
MACHINE LEARNING AND DATA SCIENCE
(2015 Pattern) (Semester - I) (410501)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

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

Q1) a) Why can't linear regression be used in place of logistic regression for binary classification? **[6]**

b) Explain evaluation methods for clustering algorithms. **[6]**

c) What is ensemble learning? Differentiate between bagging and boosting. **[8]**

OR

Q2) a) What is a logistic function? What is the range of values of a logistic function? **[6]**

b) Explain in brief application of SVM. **[6]**

c) What do you mean by Hierarchical clustering methods? What are the advantages of Agglomerative Hierarchical clustering technique? **[8]**

Q3) a) Draw the preceptron network with the notation. Derive an equation of gradient descent rule to minimize the error. **[4]**

b) Explain the importance of the terms : **[6]**

i) Hidden layer

ii) Generalization

iii) Stopping criterion

c) Draw and explain basic architecture of artificial neural network? **[8]**

OR

Q4) a) What are limitations of Multilayer Perceptrons? **[4]**

b) What is perceptron learning? Explain generalize delta rule? **[6]**

c) What is activation function? State and explain any two activation functions. **[8]**

P.T.O.

Q5) a) Draw and explain the architecture of Convolutional Neural Network. **[8]**

b) Write a note on Recursive Neural Network. **[8]**

OR

Q6) a) Explain in brief Long Short Term Memory (LSTM). **[8]**

b) Write a note on Recurrent Neural Network. **[8]**

Q7) a) Explain Latent Dirichlet Allocation algorithm with an example. **[8]**

b) What is TF and IDF? How document is represented with TF-IDF explain with an example. **[8]**

OR

Q8) a) State and explain different text similarity measure. **[8]**

b) Explain the process of tokenization during Text Processing. **[8]**

Total No. of Questions : 8]

SEAT No. :

P225

[Total No. of Pages : 2

[5871]-751
B.E. (Honor - IOT)
HONORS INTERNET OF THINGS
Machine Learning for Internet of Things
(2015 Pattern) (Semester - I) (410601)

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

Instructions to the candidates :

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

Q1) a) State and explain reinforcement learning with examples. **[8]**

b) Discuss feature engineering in machine learning. **[6]**

c) Explain Decision tree algorithm with example. **[6]**

OR

Q2) a) Explain machine learning techniques & Paradigms. **[8]**

b) Explain feature set selection using machine learning. **[6]**

c) Write a note on support vector machine. **[6]**

Q3) a) Explain algorithm optimization in least square solver for shallow neural network. **[8]**

b) Explain Hardware implementation of least square solver for shallow neural network. **[9]**

OR

Q4) a) Explain with example limitations of machine learning accelerators. **[9]**

b) Write a short note on IOT based smart building. **[8]**

Q5) a) What are core challenges in embedded deep learning? Explain with example. **[8]**

b) Write a note on real-time IOT imaging with deep neural network. **[9]**

P.T.O.

OR

Q6) a) What is deep learning? Explain its applications in IOT environment. **[9]**

b) Write a note on sensor data analysis in using deep learning models. **[8]**

Q7) a) Write a note on smart transportation system using IOT. **[8]**

b) How IOT technologies helpful in smart healthcare system? Explain with example. **[8]**

OR

Q8) a) What is IOT? How it is implemented in agriculture? **[8]**

b) Explain the role of machine learning in video survillence system for smart security system. **[8]**

Total No. of Questions : 10]

SEAT No. :

P226

[Total No. of Pages : 2

[5871]-752

B.E. (Computer Engineering)

HONORS - VIRTUAL REALITY AND AUGMENTED REALITY

Virtual Reality in Game Development

(2015 Pattern) (Semester - I) (410701)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Differentiate between virtual reality and augmented reality. **[6]**

b) Explain with diagram the cycle of interaction. **[4]**

OR

Q2) a) Write short note on : **[6]**

i) Define Stage

ii) Make Stage

iii) Learn Stage

b) Differentiate between Mobile vs. Location-Based VR. **[4]**

Q3) a) What is virtual reality? Explain types of head-mounted displays. **[6]**

b) Describe Expert Evaluations method used in learn stage. **[4]**

OR

Q4) a) Mention different characteristics of input devices considered when choosing hardware and designing interactions. **[6]**

b) Describe SMART in define stage of iterative design. **[4]**

Q5) a) Comparison between Unity and Unreal Engine. **[8]**

b) What are Fundamentals of sprite animation? **[8]**

P.T.O.

OR

Q6) a) Explain working with Unity's UI System. **[8]**

b) Explain step to develop town view using unity. **[8]**

Q7) a) How to create a battle system in VR environment. **[8]**

b) State different pre-processor directives that Unity recognizes. **[8]**

OR

Q8) a) How to building in-game menu structures. Explain. **[8]**

b) Explain workflow of Mecanim Animation System. **[8]**

Q9) a) Explain in short different theories of motion sickness. **[6]**

b) State different examples of reducing adverse effects. **[6]**

c) Explain system delays in VR systems with diagram. **[6]**

OR

Q10) a) State any six system factor that contribute to adverse effects. **[6]**

b) Explain any three terms w.r.t. physical issues involved with the use of VR equipment. **[6]**

i) Physical fatigue

ii) Headset fit

iii) Injury, and

iv) Hygiene

c) Explain unified model of motion sickness with diagram. **[6]**

Total No. of Questions : 10]

SEAT No. :

P976

[Total No. of Pages : 3

[5871]-753
B.E. (Honours)
ARTIFICIAL INTELLIGENCE AND MACHINE
Soft Computing and Deep Learning
(2015 Pattern) (Semester - II) (410303)

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

Q1) a) Differentiate Supervised Learning and Unsupervised Learning. **[3]**

b) What is soft computing? Indicate biological analogies of basic techniques of soft computing. Describe why soft computing is particularly useful in representing and reasoning with human-oriented knowledge. **[6]**

OR

Q2) a) Define the following for membership functions: **[3]**

i) Core

ii) Support

iii) Boundary

b) Define Crisp and Fuzzy relation. Describe fuzzy max-min composition, fuzzy min-max composition and max-product composition. **[6]**

Q3) a) Explain in detail Mamdani FIS.(Fuzzy Inference System) **[3]**

b) Explain fuzzification and defuzzification techniques. **[6]**

OR

P.T.O.

Q4) a) Explain in detail convergence working principle in genetic algorithm. **[3]**

b) What is genetic programming? Write and explain the executional steps of Genetic Programming. **[6]**

Q5) a) Explain working of Bayesian Neural Networks with suitable diagram. **[6]**

b) What is Neural Network? Explain with suitable diagram the different classes of network architecture. **[6]**

c) Explain the following terms: **[4]**

i) Theano in Deep Learning.

ii) Caffe in Deep Learning.

OR

Q6) a) Explain in detail various Open Source Deep Learning Libraries and Platforms. **[6]**

b) What do you mean by Tensor in TensorFlow? What are the Programming elements of TensorFlow? **[6]**

c) Explain in detail Feed Forward Neural Network. **[4]**

Q7) a) Explain with example Self Organizing Maps. **[8]**

b) What is a Deep Belief Network? How did Deep Belief Neural Networks Evolve? **[6]**

c) What is image captioning in Deep Learning? **[4]**

OR

Q8) a) What is the role of the Activation functions in Neural Networks? Explain in detail some of the popular Activation Functions used in Neural Networks. **[8]**

b) What is pooling? What are the different types of Pooling? Explain their characteristics. **[6]**

c) What do you mean by Perceptron? Explain in detail different types of Perceptrons? **[4]**

Q9) a) Explain following with example **[8]**

i) Sequential processing LSTM

ii) Recurrent Neural Network(RNN)

b) Explain in detail architecture Convolution Neural Network (CNN). Write down various properties of CNN representations. **[6]**

c) Explain on detail Architecture of Back Propagation (BP) Networks. **[4]**

OR

Q10)a) What is associate memory in neural network? Explain various types and applications of associative memory. **[8]**

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

i) Artificial Neural Network (ANN)

ii) Application of RNN

c) Explain Adaptive Resonance Theory? What is the major difference between ART1 and ART2? **[4]**

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Total No. of Questions : 12]

SEAT No. :

P227

[Total No. of Pages : 2

[5871]-754
B.E. (Honors)
INFORMATION SYSTEMS MANAGEMENT
(2015 Pattern) (Semester - II) (410403)

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

Instructions to the candidates:

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

Q1) a) What is the impact of information systems on organization? **[5]**

b) What are the challenges posed by strategic information systems and how should they be addressed? **[5]**

OR

Q2) a) How does Porter's competitive forces model help companies develop competitive strategies using information systems? **[5]**

b) How do information systems uses synergies, core competencies and network based strategies to achieve competitive advantages? **[5]**

Q3) a) Why do contemporary information system technology and the internet pose challenges to the protection of individual privacy and intellectual property? **[5]**

b) Explain challenges to intellectual property rights? **[5]**

OR

Q4) a) List and describe the five steps in an ethical analysis. **[5]**

b) Explain how the Internet challenges the protection of individual privacy and intellectual property **[5]**

Q5) a) Explain current tredns in hardware platform? **[8]**

b) How to deal with platform and infrastructure changes in IT infrastructure and management solution? **[5]**

OR

P.T.O.

Q6) a) Explain **[8]**

i) Virtualization

ii) Consumerization of IT & BYOD

b) Explain enterprise application? **[5]**

Q7) a) Explain the important dimensions of knowledge? **[6]**

b) Explain business intelligence in the enterprise system? **[6]**

OR

Q8) a) Explain enterprise content management? **[6]**

b) What are the stages in decision making process? **[6]**

Q9) a) How can firms access the business value of information? **[6]**

b) Explain the stapes in change management process? **[6]**

OR

Q10)a) What methods can be used selecting & evaluating information systems project and aligning them with the firm's business goal? **[6]**

b) Explain **[6]**

i) Managing project risk

ii) Dimensions of project risk

Q11)a) What is block chain? Explain key elements of block chain? **[8]**

b) Explain importance of personal information security? **[5]**

OR

Q12)a) What are the components of information security? Explain with its example? **[8]**

b) What is bitcoin? Explain any two types of cryptocurrency? **[5]**

Total No. of Questions : 8]

SEAT No. :

P228

[Total No. of Pages : 2

[5871]-755

B.E. (Honors)

ARTIFICIAL INTELLIGENCE FOR BIG DATA ANALYTICS

(2015 Pattern) (Semester - II) (410503)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Explain scalable machine hearning using spark. **[6]**

b) Explain Hadoop Ecosystem in detail. **[6]**

c) List and explain the applications of computer vision. **[8]**

OR

Q2) a) What are the features likely to be detected by the initial layers of neural netwrok used for computer vision? How is this different from what is detected by the later layers of the neural network? **[6]**

b) Explain computer vision applications : object detection. **[6]**

c) Explain the process of tokenization during text processing. **[8]**

Q3) a) What are some of the machine learning algorithms that can be used for computer vision. **[4]**

b) Explain spark - basics and pyspark. **[6]**

c) List and explain the applications of NLP. **[8]**

OR

Q4) a) Which of the techniques that can be used to compute the distance between two word vectors in NLP? **[4]**

b) List some of the best NLP tools and explain one of then? **[6]**

c) List and explain the applications of computer vision. **[8]**

P.T.O.

Q5) a) Explain how programmability can be improved by using Pig and Hive in Hadoop. **[6]**

b) Explain NLP application : Sentiment Analysis. **[6]**

c) Demonstrate content based recommendation system. **[4]**

OR

Q6) a) Explain HDFS and Map Reduce. **[6]**

b) Explain Python and Hadoop Streaming. **[6]**

c) Explain Recurrent Neural Networks. **[4]**

Q7) a) Write note on Artificial Intelligence explaining its need and applications. **[6]**

b) Explain logic programming with an example. **[6]**

c) List down the names of some popular Activation functions used in Neural Networks. **[4]**

OR

Q8) a) Illustrate the constraint satisfication problem with suitable example. **[6]**

b) How does forward propagation and back propagation work in ANN? **[6]**

c) What is the role of the Activation functions in Neural Networks? **[4]**

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Total No. of Questions : 8]

SEAT No. :

P229

[Total No. of Pages : 2

[5871]-756
B.E. (Honors)
INTERNET OF THINGS SECURITY
(2015 Pattern) (Semester - II) (410603)

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) ***Draw neat diagram whenever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) Draw general structure of IoT system and explain how digital signature can be used to maintain integrity and authenticity of digital contents. **[6]**

b) Explain two commonly used identity authentication protocols used for IoT environment in detail. **[5]**

c) What is public key cryptography? How can it help to secure IoT applications? **[6]**

OR

Q2) a) List different protocols developed for IP connectivity at different layers of IoT. Explain certificate based DTLS handshake procedure with neat diagram. **[6]**

b) Explain CoAP protocol for IoT environment. **[5]**

c) Briefly discuss X.509 certificate scheme. **[6]**

Q3) a) Explain the data life cycle in IoT. How can we protect data in IoT? **[6]**

b) Write a short note on IoT security for machine learning applications. **[6]**

c) List and explain the application-interface layer security threats in IoT. **[6]**

OR

Q4) a) State the security challenges in IoT and describe the current schemes for IoT security. **[8]**

b) Draw and explain the generic SOA architecture for IoT environment. Explain the security concerns to be considered in this architecture. **[10]**

P.T.O.

Q5) a) Identify the security issues in integration of RFID and WSNs. Describe in detail. **[6]**

b) How do maintain confidentiality and security for IoT based health care applications? **[6]**

c) Which security schemes can be applied to protect information in Wireless Sensor Networks (WSNs)? Discuss. **[6]**

OR

Q6) a) Discuss the security attacks in WSNs. **[6]**

b) List multiple systems/devices involved in identification and tracking technologies of IoT environment. Discuss threats and challenges to achieve security in these systems. **[6]**

c) List and explain main potential attacks in 6LoWPAN. Discuss security protocols and privacy issues in 6LoWPAN. **[6]**

Q7) a) Draw and explain the system model for Intelligent Traffic system. **[6]**

b) What is the role of IoT in connected cars? Write a short note on "Connected cars security and automation". **[6]**

c) Briefly discuss the case study on "Smart electric vehicle scheduling". **[5]**

OR

Q8) a) Describe blockchain enabled food supply chain traceability system in detail. **[6]**

b) Comment on "IoT in Smart Cities". **[5]**

c) Provide IoT-based solution for "smart home" use case. **[6]**

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Total No. of Questions : 10]

SEAT No. :

P230

[Total No. of Pages : 2

[5871]-757

B.E. (Honors)

APPLICATION DEVELOPMENT USING AUGMENTED REALITY AND VIRTUAL REALITY

(2015 Pattern) (Semester - II) (410703)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8. Q.9 or Q.10.***
2) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) Differentiate between Virtual reality and Augmented Reality and Mixed reality? **[5]**

b) What are the software and hardware requirement of VR integration? **[5]**

OR

Q2) a) Explain the applications areas of AR and VR? **[5]**

b) What is Google VR SDK? **[5]**

Q3) a) Explain text optimization in VR. **[5]**

b) Explain anatomy of SLAM. **[5]**

OR

Q4) a) What are different features of AR toolkit? **[5]**

b) How to do Loop detection and loop closing in AR? **[5]**

Q5) a) Explain different classes in C#? **[6]**

b) Explain functions and macros in C# unit with suitable example? **[12]**

OR

Q6) a) How to define variables in C# Unity? Explain with example. **[6]**

b) Explain dynamic memory allocation with suitable example in C# with Unity. **[12]**

P.T.O.

Q7) a) Explain advantage and disadvantage of AR and VR technologies. **[5]**

b) What are different AR components? **[3]**

c) Explain structure and working of HTC Vive. **[8]**

OR

Q8) a) What is Google Cardboard? **[4]**

b) Explain structure and working of Samsung gear VR. **[6]**

c) Explain Virtual Retinal System in detail. **[6]**

Q9) a) Explain different human factors considered for AR VR? **[6]**

b) Write the use cases for AR VR in health and medicine. **[10]**

OR

Q10) a) Explain legal and social consideration factors of AR VR. **[6]**

b) Explain with example use of AR VR in Telerobotics and Telepresence. **[10]**

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Total No. of Questions : 10]

SEAT No. : ____

P6529

[Total No. of Pages : 2

[5871]-801

B.E. (Computer Engineering)

SOFTWARE DESIGN METHODOLOGIES AND TESTING

(2012 Pattern) (Semester - II) (410449)

Time : 2½ Hours] **[Max. Marks : 70**

Instructions to the candidates:

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

Q1) a) Draw use case diagram for online Event Registration system with all advanced notations. **[5]**

b) Explain the significance of Dynamic modeling? Explain in brief the different Dynamic diagrams in IML. **[5]**

OR

Q2) a) What are the major classification of design pattern? Explain in brief with few example patterns under each class. **[5]**

b) Explain COMET and phases of COMET by use case approach. **[5]**

Q3) a) Explain the real time software architecture with suitable example. **[5]**

b) Explain factory pattern. Describe its intent, motivation and implementation with suitable example. **[5]**

OR

Q4) a) What is singleton pattern? Explain one example scenario where you will singleton pattern to get applied. **[5]**

b) Explain Web Service Protocols in brief. **[5]**

Q5) a) Explain difference between verification and validation? **[8]**

b) Explain various principles of testing? **[8]**

OR

P.T.O.

Q6) a) Discuss the generic steps in defect management process? **[8]**

b) Explain V test model with suitable block diagram? **[8]**

Q7) a) Explain top down and bottom integration testing. **[6]**

b) Explain equivalence and boundary value analysis? **[6]**

c) Differentiate between alpha and beta testing. **[6]**

OR

Q8) Write short notes on: **[18]**

a) White Box Testing

b) Security Testing

c) Acceptance Testing

Q9) a) Explain mobile testing? What are different challenges in mobile testing? **[8]**

b) Differentiate between automated and manual testing? **[8]**

OR

Q10) Write short note on: (Any two) **[16]**

a) JUnit.

b) Selenium

c) Monkey Talk

Total No. of Questions : 8]

SEAT No. :

P6530

[Total No. of Pages : 3

[5871]-802

B.E. (Computer Engineering)

MOBILE COMPUTING

(2012 Pattern) (Semester - II) (410451(A)) (Elective - III)

Time : 2½ Hours] **[Max. Marks : 70**

Instructions to the candidates:

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

Q1) a) What is the need of spread spectrum technology? Explain FHSS with one example. **[7]**

Need of spread spectrum technology: 2 Marks

Explanation of FHSS with one example: 5 Marks

b) Explain various traffic and control data channels used in GSM network. **[6]**

Basics about channels: 1 Mark

Control Channels: 3 Marks

Data Channels: 2 Marks

c) How the given set of frequencies are used to increase capacity of a network. **[7]**

Functioning of Cellular network: 2 Marks

Frequency reuse concept: 5 Marks

OR

Q2) a) Explain various application of a WPAN network. **[7]**

Working of WPAN: 1 Mark

Any TWO applications: 3 Marks each

b) Describe the protocols between the different units in GSM system architecture. **[6]**

Explanation with figure: 6 Marks

c) What are the limitations of Mobile Devices? **[7]**

Any Seven Limitations: 1 Marks each

P.T.O.

Q3) a) Explain the process of location Management in GSM Network. **[8]**

Explanation with figure: 8 Marks.

b) Explain the modifications of Indirect TCP and also discuss the advantages and disadvantages of Indirect TCP? **[8]**

Explanation Indirect TCP working : 2 Marks

Explanation of Modification : 4 Marks

Advantages and disadvantages: 2 Marks

OR

Q4) a) Describe DSR and AODV Routing Protocols. Compare both on various parameters. **[8]**

Explanation of Reactive routing :1 Marks

Working of DSR and AODV : 4 Marks

Comparison: 3 Marks

b) How is the binding between the home agent and the foreign agent created in Mobile-IP? **[8]**

Working of Mobile-IP : 3 Marks

Binding process : 5 marks

Q5) a) What are the advantages and disadvantages of Push-based data-delivery? **[8]**

Push-based data-delivery mechanism: 2 Marks

Advantages and Disadvantages : 3 Marks Each

b) Explain the reason for communication asymmetry in mobile network. Give examples of asymmetric communication architecture for data dissemination. **[9]**

Reason: 3 Marks

Explanation with examples : 6 Marks

OR

Q6) a) Explain Data Synchronization Protocols for synchronizing mobile applications at mobile devices. **[8]**

Detail explanation: 8 Marks

b) What do you mean by synchronization softwares'? Explain ActiveSync software in details. **[9]**

Explanation of synchronization softwares: 3 Marks

Explanation of ActiveSync software in details: 6 Marks

Q7) a) Why does an agent move from tier to tier during an application? **[8]**

Functions of Mobile agents : 2 Marks

Reason: 6 Marks

b) Describe a transcoding gateway and its applications in mobile computing systems. **[9]**

Role of Gateway : 2 Marks

Transcoding Gateway architecture : 4 Marks

Applications in mobile computing systems: 3 Marks

OR

Q8) a) List Various operating Systems used as Mobile OS. Explain Architecture of Android application development platform. **[9]**

Any four Mobile OS: 4 Marks each

Architecture of Android application development platform: 5 Marks

b) Explain the requirements of a mobile file system over the conventional one, also describe CODA file system. **[8]**

Requirements : 4 Marks

Description of CODA FS: 4 marks

Total No. of Questions : 10]

SEAT No. : ____

P6531

[Total No. of Pages : 2

[5871]-803

B.E. (Computer Engineering)

MOBILE APPLICATIONS

(2012 Pattern) (410452 C) (Semester-II) (Elective -IV)

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

Instructions to the candidates:

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

Q1) a) What is the best way to test mobile site before launch? **[6]**

b) Explain WAP push in detail? **[4]**

c) Explain the benefits of mobile Applications? **[5]**

OR

Q2) a) Explain web services along with suitable advantages? **[6]**

b) What are the mobile myths? **[5]**

c) Explain different mobile devices? **[4]**

Q3) a) Explain smart phones and its features? **[6]**

b) Differentiate between WAP 1 & WAP2? **[5]**

c) How to choose a mobile development options? **[4]**

OR

Q4) a) Explain pros and cons of various mobile web development options? **[5]**

b) Differentiate between Emulators and Simulators? **[5]**

c) Explain in detail Android Emulators? **[5]**

Q5) a) Explain CSS3 for mobile browser? **[5]**

b) Explain WML with suitable example? **[5]**

c) Write short note on mobile Boiler plate? **[5]**

OR

P.T.O.

Q6) a) Explain following FORM ELEMENTS with respect to HTML 5? **[12]**

i) Password boxes

ii) Multiline text boxes

iii) Check boxes

iv) Radio buttons

v) Date selectors

vi) Time selectors

b) Explain touch keypad Input method? **[3]**

Q7) a) How do you detect device type in a web application? **[5]**

b) Explain different Java script libraries? **[5]**

c) Explain with example CSS selector? **[5]**

OR

Q8) a) Write short note on sencha Touch? **[5]**

b) Explain web SQL database API? **[5]**

c) How do you validate a FORM. Explain with example? **[5]**

Q9) a) Write short note on cloud based browsers? **[6]**

b) Write short note on mobile SEO? **[4]**

OR

Q10)a) Explain W3C Geolocation API? **[5]**

b) Write short note ENYO Java script framework? **[5]**

Total No. of Questions : 10]

SEAT No. : ____

P6532

[Total No. of Pages : 2

[5871]-804

B.E. (Mechanical)

POWER PLANT ENGINEERING

(2012 Pattern) (Semester-II) (402047)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw a neat diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator, steam tables is allowed.***
5) ***Assume suitable data if necesssary.***

Q1) a) What is meant by depreciation of power station? Explain the straight line method and sinking fund method of calculating depreciation. **[6]**

b) What is load curve? What is its significance in power generation? **[4]**

OR

Q2) a) Explain the following terms. **[6]**

i) Demand factor

ii) Connected load

iii) Maximum demand

iv) Capacity factor

b) Define 'vacuum efficiency' applied to a condenser? State the effects of air leakage on the performance of a condenser. **[4]**

Q3) a) Explain with neat sketch Boiling Water Reactor (BWR). **[6]**

b) What is hydrograph? Explain its use in practice. **[4]**

OR

Q4) a) With neat sketch explain the working of steam power plant. **[6]**

b) Steam enters the condenser at 35.8ºC with barometer reading of 760 mm of Hg. A vacuum of 700 mm was recorded in the condenser. Determine the vacuum efficiency. **[4]**

P.T.O.

Q5) a) Discuss the selection of engine size, advantages and disadvantages of Diesel engine power plant? **[8]**

b) With neat sketch and explain the following. **[8]**

i) Intercooling

ii) Reheating

iii) Regeneration

OR

Q6) a) A gas turbine power plant operates on the simple Brayton cycle with air as a working fluid and delivers 32 MW of power. The minimum and maximum temperatures in the cycle are 310 K and 900 K, respectively, and the pressure of air at the compressor exit is 8 times the value of the compressor inlet. Asuming an isentropic efficiency of 80% for the compressor and 86% for the turbine, determine the mass flow rate of air through the cycle. **[8]**

b) Why the supercharging of is necessary in diesel plant? What are the methods used for supercharging the diesel engine? What are the advantages of supercharging? **[8]**

Q7) a) What are the Technical, Economic and Environmental considerations in selecting site for wind power plant? **[8]**

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

i) Fuel Cell

ii) Bio-Gas Power plant

OR

Q8) a) What is a hybrid power generation system? Explain with neat sketch working of solar wind hybrid systems. Also list its merits. **[8]**

b) What do you understand by MHD? Explain the working principle of MHD with neat sketches. **[8]**

Q9) a) Describe the methods used to control SO_2 and NO_x in steam power plant. **[9]**

b) What are the different types of relay? What is its function? With neat sketch explain any two types of relay used in power plants. **[9]**

OR

Q10)a) What do you understand by thermal pollution? Explain the air and water pollution caused by thermal power plants. **[9]**

b) What are circuit-breakers? What is its function in supply system? Explain with neat sketch working of any two types of circuit breakers. **[9]**

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Total No. of Questions : 10]

SEAT No. : ____

P6533

[Total No. of Pages : 3

[5871]-805

B.E. (Mechanical)

DESIGN OF PUMPS, BLOWERS & COMPRESSORS

(2012 Pattern) (Elective-IV) (Semester-II) (402050 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) ***Answer for questions should be written in one single answer sheet only.***
3) ***Figures to the right indicate full marks.***
4) ***Neat figures should be drawn, wherever necessary.***
5) ***Use of electronic pocket calculator is allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) Explain performance characteristics of Pump, Fan, Blower and Compressor (any 1 with neat sketch/graph) **[5]**

b) A rotary air compressor working between 1 bar and 2.5 bar has internal and external diameter of impeller as 300mm and 600mm respectively. The vane angle at inlet and outlet are 30º and 45º respectively. If air enters at 15m/s, Find **[5]**

i) Speed of rotation in rpm

ii) Work done by compressor per kg of air

OR

Q2) a) Explain the different applications of compressors, fans, blowers. **[5]**

b) A centrifugal pump impeller whose external diameter and width at the outlet are 0.8 and 0.1m respectively is running at 550rpm. The angle of impeller vanes at outlet is 40º. The pump delivers 0.98m^3 of water per second under an effective head of 35m. If the pump is driven by 500KW motor, determine. **[5]**

i) Manometric Efficiency

ii) Overall Efficiency

iii) Mechanical Efficiency

P.T.O.

Q3) a) Explain Indicator diagram in Reciprocating Pumps? **[5]**

b) A double acting reciprocating pump has piston of diameter 250mm and piston rod of diameter 50mm which is on one side only. Length of piston stroke is 350mm and speed of crank moving the piston is 60rpm. The suction and delivery heads are 4.5m and 18m respectively. Determine the discharge capacity of the pump and the power required to operate the pump. **[5]**

OR

Q4) a) What is Slip? Explain the concept of Negative Slip? **[5]**

b) For a pump with no air vessel, stroke length=300mm, piston diameter=125mm, suction pipe diameter=75mm, length of suction pipe=6m and suction head=3m. Atmospheric pressure=10.3m of water and separation may be assumed to occur when the absolute pressure head in the cylinder falls below 2.5m of water. Calculate the maximum speed at which the pump may be run if separation is to be avoided. **[5]**

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

b) How does the dust erosion of centrifugal fan/blower occurs? What is it's effect on the performance? **[8]**

OR

Q6) a) Explain the different mechanical losses in fans and blowers. **[8]**

b) A centrifugal blower takes in $180m^3$/min of air pressure p_1=1.013 bar and temperature t_1=43°c and delivers it at 750 mm W.G. Taking the efficiencies of the blower and drive as 80% & 82% respectively. Electric motor driving the blower runs at 3,000 rpm. Determine the power required to drive the blower and specific speed. **[8]**

Q7) a) What are main cause for noise generation? What are methods for reducing the fan noise? **[8]**

b) An axial fan stage consisting of only a rotor has the following data.

Rotor blade air angle at exit	10°
Tip diameter	60 cm
Hub diameter	30 cm
Rotational speed	960 rpm
Power required	1 kW
Flow coefficient	0.245

(inlet flow conditions P_1=1.02 bar and T_1=316 K)

Determine the rotor blade angle at the entry, the flow rate, stage pressure rise, overall efficiency, degree of reaction, and specific speed. **[8]**

OR

Q8) a) Explain performance of axial fans with neat graph. **[8]**

b) A centrifugal fan has the following data: **[8]**

Inner diameter of the impeller	18 cm
Outer diameter of the impeller	20 cm
Speed	1450 rpm
The relative and absolute velocities respectively are	
At entry	20m/s, 21m/s
At exit	17 m/s, 25 m/s
Flow rate	0.5 kg/s
Motor efficiency	78%

Determine.

i) Stage Pressure rise

ii) Degree of reaction

iii) the power to drive the fan Take desity of air as 1.25 kg/m^3

Q9) a) Explain Enthalpy-Entropy diagram for Centrifugal Compressor in details. **[8]**

b) A Centrifugal air compressor compresses air from 1 bar to 3 bar. Internal and outer diameter of the impeller are 0.2 m and 0.4 m respectively. The impeller blade angle at inlet is 30º and at exit is 40º. Air enters the impeller blade radially at a speed of 12 m/s. Find

i) Speed of impeller in RPM

ii) Workdone per Kg of air

iii) Thickness of the impeller blades for mass flow rate of air as 0.5Kg/s, if impeller has 30 blades and width of each impeller blade is 5.5 cm. Assume the specific volume of air as 0.82m^3/kg and velocity of flow constant throughout. Assume isentropic process and Cp=1.005KJ/KgK. **[10]**

OR

Q10)a) Write a note on 'Prewhirl' of Compressor. **[8]**

b) An axial flow compressor is designed for 50% reaction with inlet and outlet air angles for rotor blades as 80º and 45º respectively measured from axial direction. The mean blade speed is 200m/s and axial velocity of flow is constant throughout. Assuming work factor of 0.88, find the number of stages required if total pressure ratio is 4:1 with an isentropic efficiency of 85%. The stagnation inlet temperature may be 290K. Assume isentropic process, R=287Nm/KgK, Cp=1.005KJ/KgK. **[10]**

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Total No. of Questions : 10]

SEAT No. :

P6534

[Total No. of Pages : 2

[5871]-806
B.E. (Mechanical)
REFRIGERATION AND AIR-CONDITIONING
(2012 Pattern) (402041)

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

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Draw neat diagram wherever necessary.***
3) ***Use of scientific calculator, Psychrometric chart is allowed.***
4) ***Assume suitable data wherever necesssary.***
5) ***Figures to the right indicate full marks.***

Q1) a) State adavantages and disadvantages (four each) of air refrigeration. **[4]**

b) A domestic food freezer maintains a temperature of –15ºC. The ambient temperature is 30ºC. The heat leaks into the treezer at 1.75 kJ/S. What is the minimum power necessary to pump this heat out? **[6]**

OR

Q2) a) State any four applications of refrigeration. **[4]**

b) Draw skeleton of p-h diagram and mark the property line on it. Sketch ideal vapour compression cycle on p-h diagram and mark the name of processes. **[6]**

Q3) a) Discuss the effect of subcooling on performance of VCC with the help of p-h diagram. **[4]**

b) Explain with suitable diagram the working lithium bromide vapour absorption system. **[6]**

OR

Q4) a) Compare vapor absorption system with vapour compression system **[4]**

b) State desirable properties of refrigerant. List four eco-friendly refrigerant and state why eco-friendly refrigerant must be used? **[6]**

Q5) a) Define effective temperature and discuss the effect of **[6]**

i) Climate and Seasonal Variation and

ii) Density of Occupation on optimum effective temperature.

b) Air enters a window air conditioner at 1 atm, 30ºC and 80% RH at a rate of 10 m^3/min and it leaves at saturated at 14ºC. A part of moisture, which condenses during the process is also removed at 14ºC. Determine the rate of heat and moisture removal from air. show the process on psychrometric chart. **[10]**

OR

Q6) a) The moist air is passed through a cooling section where it is cooled and dehumidified. How do the specific humidity and relative humidity of air change during this process? Show the process on psychrometric chart. **[6]**

b) $142 m^3$/min moist air at 5ºC with specific humidity of 0.002 kg/kg of dry air is mixed adiabatically with 497.07 kg/min of moist air stream at 24ºC and 50% relative humidity. If the pressure is constant throughout at 1 bar. **[10]**

Determine

i) the humidity ratio, and

ii) the temperature of the mixed stream.

Q7) a) Draw a schematic of summer air conditioner and explain its working in brief. **[6]**

b) Compare unitary and central air conditioning systems. **[6]**

c) Draw a schematic of , Flooded evaporator and explain its working. **[6]**

OR

Q8) a) Draw *p-v* diagram for single acting reciprocating compressor and explain its working. **[6]**

b) Explain all water air conditioning system. **[6]**

c) Explain the working of a capillary tube with suitable diagram. **[6]**

Q9) a) Draw an AHU and mark its components. **[4]**

b) What are desirable properties of duct materials? **[4]**

c) A 12 m long duct passes air at a rate of 1.2 m^3/s. If the friction factor is 0.0048, calculate the pressure drop in the following ducts **[8]**

i) Circular duct of 280 mm diameter, and

ii) Square duct of 280 mm side.

OR

Q10)a) Prove that the equivalent diameter of rectangular duct for same air flow rate is given by **[8]**

$$D_{eq} = 1.265\left[\frac{(ab)^3}{(a+b)}\right]^{1/5}$$

Where a/b is aspect ratio.

b) Draw the perimeter type and extended plenum system of duct arrangements. Discuss their features. **[8]**

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Total No. of Questions : 10]

SEAT No. : ____

P6535

[Total No. of Pages : 2

[5871]-807

B.E. (Computer Engineering)

BUSINESS ANALYTIC AND INTELLIGENCE

(2012 Pattern) (Semester-II) (410452A) (Elective-IV (A))

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 Q6, Q.7 or Q.8, Q.9 or Q.10.***

Q1) a) Explain the Business Intelligence Environment and Architecture. **[5]**

b) Explain Development of Decision Support System (DSS) **[5]**

OR

Q2) a) Explain application of Decision Support System in banking. **[5]**

b) What are the Obstacle to Business Intelligence in an Organization. **[5]**

Q3) a) Explain the following terms in context with the dimensional modeling. **[5]**

i) Fact

ii) Dimension

b) Differentiate between Star schema and Snowflake Schema with suitable example. **[5]**

OR

Q4) a) Describe any one approach for designing Data warehouse in detail. **[5]**

b) Explain the Descriptive Business Analytics with suitable example. **[5]**

Q5) a) What is the need of data pre-processing? Explain various data cleaning techniques. **[6]**

b) Explain concept hierarchy generation for numerical data. **[5]**

c) Explain ROLAP and DOLAP in detail. **[6]**

OR

P.T.O.

Q6) a) Explain proximity-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. **[5]**

i) What is the mean of the data?

ii) Give the five-number summary of the data.

c) Discuss any two methods for data transformation strategy in the data transformation process. **[6]**

Q7) a) Explain steps in designing business Intelligence system. **[6]**

b) Explain the term "Resilience" in the context of business continuity. **[6]**

c) How to manage Business operations for the Business Continuity. **[6]**

OR

Q8) a) Explain Capacity Planning in terms of Business Intelligence infrastructure. **[6]**

b) Explain the term "Contingency" in the context of business continuity. **[6]**

c) Explain the important factors to consider while planning for availability of Business Intelligence system. **[6]**

Q9) a) Explain Data Analytics with suitable example. **[5]**

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. **[5]**

c) Explain Business Intelligence applications in the Telecommunications. **[5]**

OR

Q10) Explain the applications of Business Intelligence in:

a) Retail Industry **[5]**

b) Logistics and Production **[5]**

c) Marketing **[5]**

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Total No. of Questions : 10]

SEAT No. : ____

P6536

[Total No. of Pages : 2

[5871]-808

B.E. (Computer Engineering)

PROBLEM SOLVING WITH GAMIFICATION

(2012 Pattern) (Semester-II) (410445A) (Elective-III)

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

Instructions to the candidates:

1) ***Attempt 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) ***Assume suitable data, if necessary.***

Q1) a) Define Fun Quotient. What fun do players derive while playing Kabbadi game? **[5]**

b) Advertisement is a competitive industry. Loyalty programs are used to engage frequent travelers. Comment on how that gives rise to advertisement agency politics. **[5]**

OR

Q2) a) How playfulness has entered into Medical sector and at modern work places? **[5]**

b) What is gamification? How gamification can be incorporated with respect to SOCIAL MEDIA? **[5]**

Q3) a) Give examples of gamification related to the movies industry. How big data is collected and used by movie related APPS? **[5]**

b) What is importance of game elements? Comment on platforms, Social aspect, competition, leadership with respect to game of your choice? **[5]**

OR

Q4) a) Define games and gamification. What is role of government agencies to encourage public to pay taxes? **[5]**

b) Discuss how Choice architecture influences item buying patterns in a Shopping mall. **[5]**

Q5) a) How do you mean by game mechanics and dynamic? How these are essential building blocks of any gamified system? Give suitable examples. **[9]**

b) Describe how game mechanics like discounts, honour and gifting can be useful for gamified system? **[9]**

OR

P.T.O.

Q6) a) List and explain any four game mechanics that can be useful and interesting for gamified system. **[9]**

b) How effectively game machanics can be applied with respect to following. **[9]**

i) Encouragement to collect historical coins

ii) Collection of karma points

iii) Collection of loyalty card and air miles

Q7) a) Why do people like collecting badges. For a simple game of your choice identify four different types of badges for player activities. Write a pseudo code for awarding the first badge. **[8]**

b) How Nike Plus-a social running game, employs sophisticated game mechanics to encourage casual and hardcore runners? **[8]**

OR

Q8) a) How wining a trophy is different than badges or other achievement in a game? Draw a simple screen shot for a trophy case. **[8]**

b) What are challenges in motivating people to ask and answer questions on social networking site? **[8]**

Q9) a) What meaning of defining desired behavior of a player? What are a few behaviors to implement for an initial launch of a website? (Hint: like Skumo) **[8]**

b) What is the role play for following types of players during game design with respect to Mumbai platform? **[8]**

i) Reviewers

ii) Commentary

iii) Raters

iv) Power promoter

v) Model number

OR

Q10)a) What are badges design recommendations? **[8]**

b) What are the steps for developing a Badgeville reward program? **[8]**

Total No. of Questions : 10]

SEAT No. : ____

P6537

[Total No. of Pages : 2

[5871]-809

B.E. (Computer Engineering)

SMART SYSTEM DESIGN APPLICATION

(2012 Pattern) (Semester-I) (410443)

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) What is alpha beta pruning? Explain alpha beta search algorithm with suitable examplel. **[8]**

b) Write short notes on Kalman Filters. **[6]**

c) Explain the architecture of Goal Based agents. **[4]**

OR

Q2) a) Define problem formulation? Describe the components of problem with suitable example. **[8]**

b) Explain the environment types & PEAS properties of agent? **[6]**

c) Explain the hardware requirements for robotics? **[4]**

Q3) a) Explain the concept of uncertainty? Write down an example illustrating the behavior of an agent in an uncertain world. **[6]**

b) Write short note on structure of intelligent agents. **[4]**

c) Compare and contrast propositional logic and FOL. **[4]**

OR

Q4) a) What is Expert System shell? Why explanation is necessary in expert system? **[6]**

b) What is reasoning? What is its role in artificial intelligence. **[4]**

c) Explain support Vector Machine with issues and applications. **[4]**

P.T.O.

Q5) a) What are the basic axioms of probabillity? Explain how to derive the useful facts from the basics axioms with suitable example. **[6]**

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

i) Information Retrival

ii) Information Extraction

OR

Q6) a) What is porblem? What are the basic elements needed for solving single state problem and formalize the 8-Puzzle proplem? **[8]**

b) What is supervised learning? Explain any one. **[6]**

Q7) a) Explain machine learning types. **[6]**

b) What is Artificial Neural Network? Explain its types. **[6]**

OR

Q8) a) Explain in brief language models with suitable examples. **[6]**

b) Explain in details the components that help in reconstructing the world in 3D. **[6]**

Q9) a) Write a note on Bayesion Network. **[6]**

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

i) Dynamic Bayesian Network.

ii) Kalman Filters.

OR

Q10)a) What are the basic inference task that must be solved in a generic temporal model. **[6]**

b) Write a short note on planning with operator. **[6]**