

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

ADVANCED HYDRAULICS
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION - I

- 1 (a) Explain the classification of open channel flows.
(b) List out different types of forces which governs the open channel flows
- 2 A rectangular channel curved in the vertical plane is 3.0 m wide and has a centre line radius of 6.0 m. The velocity distribution at a radial section can be considered to be an irrotational vortex, i.e. $v = C/r$. the depth of flow is 2.0 m and is constant along the channel. For a discharge of $6.0\text{m}^3/\text{s}$, find (a) the velocity distribution (b) the average velocity and (c) the correction factors α and β .

SECTION - II

- 3 (a) Establish the relationship among roughness coefficients.
(b) Define economic channel section and derive an expression for economic rectangular channel section
- 4 A rectangular channel carries water at 22°C with a depth 0.6m. The bed width is 2m, bed slope is 0.0005. Find discharge in the channel by Chezy formula and by Darcy's friction factor if Nikuradse's sand roughness size $k_s = 0.25\text{mm}$.

SECTION - III

- 5 (a) Show that the velocity head is half the hydraulic depth at critical state of flow.
(b) A rectangular channel 3m wide carries a flow of $1.85\text{m}^3/\text{s}$ at a depth of 0.5m. A contraction of channel width is required at a certain section. Find the greatest allowable contraction in the width for upstream flow to be possible as specified.
- 6 A rectangular channel with a discharge $25\text{m}^3/\text{s}$, bottom width of 6.25m, depth $y = 2\text{m}$ is contracted to 5.75m.
(i) Find the depth at contraction and width at contraction.
(ii) When the depth at contraction is critical, what will be the width at contraction?

SECTION - IV

- 7 Derive the dynamic equation for gradually varied flow with a help of neat sketch.
- 8 A rectangular channel 9 m wide discharges water at normal depth 3.65m. The bed slope is 1 in 4000 and Manning's $n=0.017$. A dam placed downstream raises the level to a height of the profile to 6.8m immediately behind the dam. Determine the length of the profile by single step.

SECTION - V

- 9 (a) Write the uses of Hydraulic jump
(b) Explain different types of hydraulic jump.
- 10 A rectangular channel is laid on a slope of 1 horizontal: 0.15 vertical. When a discharge of $12.0 \text{ m}^2/\text{s}/\text{metre width}$ is passed down the channel at a depth of 0.6m a hydraulic jump is known to occur at a section. Calculate the sequent depth, length of the jump and energy loss in the jump. What would be the energy loss if the slope was zero?

Code : 13CE3105

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester**TRANSPORTATION ENGINEERING - II**
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION - I

- 1 a) List out various vehicular characteristics. Explain how this will effect Traffic control and regulation?
b) Define highway capacity. Explain basic capacity and practical capacity
- 2 a) What are the warrants for Traffic Signals? Explain How a Traffic Signal is designed?
b) What do you mean by spot speed? How it is measured?

SECTION - II

- 3 What are various components of a permanent way? Explain function of each component.
- 4 Define gauge. Explain various types of gauges in India.

SECTION - III

- 5 a) With the help of neat sketches explain about switches
b) Draw the layout of V-crossing.
- 6 What are various types of station yards? Explain in detail about station yards with the help of neat sketches.

SECTION - IV

- 7 a) Differentiate between Airport master plan and Regional plan.
b) List out factors considered for site selection of an airport.
- 8 Write in detail about the following:
 - i) Terminal Area
 - ii) Building Area.

SECTION – V

- 9 Explain about the following: i) Tides and winds ii) Waves and currents.
- 10 What is dredging? Explain the types of dredging.

SECTION - IV

- 7 What are costs associated with inventory? Determine EOQ for inventory model with uniform demand?
- 8 Annual demand for an item is 3200 parts. The unit cost is Rs.6 and the inventory carrying charges are estimated as 25% per annum. If the cost of one procurement is Rs.150 find:
- I. Economic order quantity
 - II. Time between two consecutive orders
 - III. Number of orders per year
 - IV. The optimal cost.

SECTION - V

- 9 Two competitors A and B are competing for same product. Their different strategies are given in the following payoff matrix. Use dominance principle to find the optimal strategies.

	I	II	III	IV
I	3	2	4	0
II	3	4	2	4
III	4	2	4	0
IV	0	4	0	8

- 10 Telephone users arrive at a booth following a poisson distribution with an average time of 5 min between one arrival and the next. The time taken for a telephone call is on an average 3 min and it follows an exponential distribution. What is the probability that the booth is busy? How many more booths should be established to reduce the waiting time to less than or equal to half of the present waiting time?

Code : 13CE3104

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

FOUNDATION ENGINEERING
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION - I

- 1 (a) Compute the factor of safety of an infinite slope in a cohesionless soil for a steady seepage condition when the flow is parallel to the slope. .
- (b) Find the critical height of an infinite slope having a slope angle of 30° . The slope is made of stiff clay having a cohesion 20 kN/m^2 , angle of internal friction 20° , void ratio 0.7 and specific gravity 2.7. Consider the following cases for the analysis. (a) the soil is dry. (b) the water seeps parallel to the surface of the slope. (c) the slope is submerged.
2. (a) Explain the method of slices for analysis of finite slopes. .
- (b) Calculate the safe height for an embankment rising 70° to the horizontal and to be made with a clayey soil having unit weight of 20 kN/m^3 , $\phi = 15^\circ$ and a cohesion of 20 kN/m^2 . Factor of safety may be taken as 2.5. Value of stability number N , corresponding to slope angle $\alpha = 70^\circ$ and $\phi = 15^\circ$ is 0.14. .

SECTION - II

- 3 (a) A 5m high rigid retaining wall has to retain a backfill of dry, cohesionless soil having the following properties:- $\phi = 30^\circ$, void ratio, $e = 0.74$, $G_s = 2.68$. Plot the distribution of Rankine lateral earth pressure on the wall and determine the magnitude and point of application of the resultant thrust. .
- (b) A retaining wall, 8m high, with a smooth vertical back, retains a clay backfill with $c' = 15 \text{ kN/m}^2$, $\phi' = 15^\circ$ and $\gamma = 18 \text{ kN/m}^3$. Calculate the total active thrust on the wall assuming that tension cracks may develop to the full theoretical depth.
4. (a) Explain the Counter fort retaining wall with the help of neat sketch?
- (b) Check the stability of a cantilever concrete retaining wall having a stem thickness of 0.4 m uniform throughout, 6.0 m height bed block thickness 0.8 m and a projection of 2.5 on the heel side and 1.5 m on the toe side. The unit weight of the wall material is 25 kN/m^3 . The soil has a unit weight of 18 kN/m^3 and an angle of internal friction of 36° . Take in to account a uniform surcharge on the ground of 50 kN/m^2 . The ground level on the toe side is 1.2 m high above the base of the wall.

SECTION – III

5. (a) Differentiate between the general shear failure and the local shear failure. How the ultimate bearing capacity in local shear is determined?
- (b) Compute the safe bearing capacity of a continuous footing 1.6m wide, at a depth of 1.5m in a soil with $\gamma = 18 \text{ kN/m}^3$, $c = 18 \text{ kN/m}^3$, and $\phi = 25^\circ$. Terzaghi's factors of $\phi = 25^\circ$ are $N_c = 25$, $N_q = 12.5$ and $N = 10$. What is the safe load per meter run if the factor of safety is 3?
6. (a) A square footing rests on pure clay with unconfined compressive strength of 270 kN/m^2 at a depth of 1.8m. Determine the size of the footing if it has to transmit a load of 720kN. Assume the bulk unit weight of soil as 18 kN/m^3 and factor of safety as 3.0.
- (b) Explain in detail the plate load test method of evaluating settlement of foundations. [6M]

SECTION – IV

7. (a) In a two layered cohesive soil, bored piles of 300mm are installed. The top layer has a thickness of 5m and the bottom one is of considerable depth. The "c" value of top layer is 40 kN/m^2 and that of the bottom is 100 kN/m^2 . Determine the length of the pile required to carry a safe load of 400kN. Assume a FOS of 3.
- (b) A square group of 9 piles was driven into soft clay extending to a large depth. The dia meter and length of the piles are 30cm (300mm) and 9m (9000mm) respectively. If the unconfined compression strength of clay is reported to be 90 kN/m^2 and the pile spacing is 90cm c/c, what is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75.
8. (a) Discuss the relative merits and demerits of wells of different shapes.
- (b) What are 'tilts and shifts' in well foundations? Explain different methods of controlling tilts and shifts.

SECTION - V

9. (a) Write short note on the depth of exploration and how can you fix the depth of boring in different cases of foundations? i.e. Shallow and deep foundations.
- (b) How do you judge the disturbing effect of soil sampler?
10. (a) Explain the soil investigation report along with bore log.
- (b) An SPT was conducted in a dense sand deposit at a depth of 20 m, and a value of 48 was observed for N. The density of the sand was 14 kN/m^3 . What is the value of N, corrected for overburden pressure?

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Code : 13CE3103

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

STEEL STRUCTURAL DESIGN

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section

All Questions carry equal marks

SECTION - I

- 1 A welded bracket connecting a plate to a column flange is shown in Fig.1. Design the welded connection.

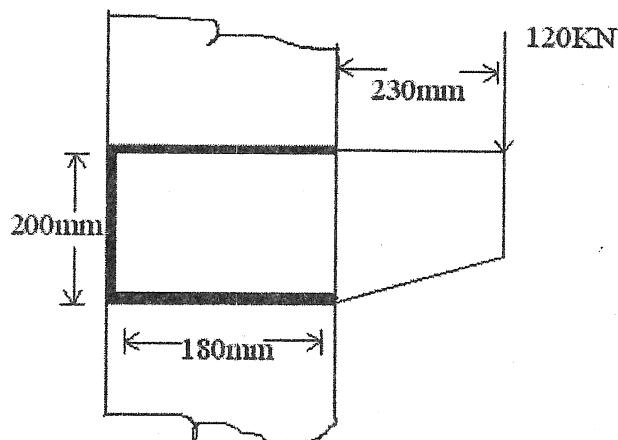


Fig. 1

- 2 (a) Sketch the various modes of failure of riveted joints.
(b) Determine the load which can be transmitted per pitch length of a double cover butt joint connected by 24 mm diameter rivets at 100 mm pitch. The thickness of main plates and cover plates are 16 mm and 12 mm respectively. Take allowable tensile strength of plate as 150 Mpa, allowable shear stress in rivets as 100 MPa, allowable stress in bearing for rivets as 300 MPa. Also, determine the efficiency of the joint.

SECTION - II

- 3 Design a tension member subjected to a pull of 500 kN using unequal angles, placed back-to-back with their longer legs connected on the same side of the gusset plate. Find the strength of the member designed as above, when it is connected on either side of the gusset plate.
- 4 Design a built up column composed of two channel sections placed back to back, carrying on axial load of 600 kN. The effective length of the column is 4 m. Also design a single lacing system.

SECTION - III

- 5 A simply supported steel joist of 6 m. effective span is laterally supported through out. It carries a concentrated load of 40kN at 4m from left end. Design an appropriate section using steel of grade Fe 410.
- 6 Design a simply supported plated rolled steel beam section to carry a uniformly distributed load of 60 kN/m inclusive of self weight. Effective span of the beam is 5 m. The depth of the beam is not to exceed 350 mm. The compression flange of the beam is laterally supported.

SECTION - IV

- 7 Design a laterally unsupported beam for the following data.
Effective span = 5 m, Maximum BM = 400 kN.m., Maximum SF = 100 kN.
Steel of Grade Fe 410.
- 8 Design a simply supported gantry girder to be used in an industrial building for the following data.
- | | |
|--|----------|
| Crane capacity | = 250 kN |
| Weight of crab | = 50 kN |
| Weight of crane (excluding crab) | = 190 kN |
| Minimum clearance between crane hook and gantry girder | = 1.2 m |
| Wheel base | = 3.5 m |
| Distance between c/c of gantries | = 18 m |
| Distance between c/c of gantry columns | = 5.5 m |
| Crane type | = E.O.T. |

SECTION - V

- 9 Design a slab base for a column section ISHB 350 carrying an axial load of 1800 kN. The base rests on M 25 concrete pedestal. The permissible bearing pressure on concrete is 4 N/mm^2 and safe bearing capacity of soil is 220 kN/m^2 .
- 10 Design a gusset base for a column section ISHB 300 carrying an axial load of 1400 kN. The permissible bearing pressure on concrete is 5 N/mm^2 and safe bearing capacity of soil is 200 kN/m^2 .

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

R.C.C. STRUCTURAL DESIGN - I
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION-I

1. (a) Discuss the merits and demerits of the traditional methods of design (working stress method, ultimate load method).
(b) Explain the basis for the selection of partial load and safety factors by the code for 'serviceability limit states'.
2. Design a rectangular beam for an effective span of 6m. The superimposed load is 52kN/m and the size of beam is limited to 300 mm × 600 mm overall. Use M₂₀ mix & Fe₄₁₅ grade steel, and support width is 300 mm each. Sketch the details of cross section of the beam at salient points, showing reinforcement details.

SECTION-II

3. Design the torsional reinforcement in a rectangular beam section 350mm wide and 750mm deep, subjected to an ultimate twisting moment of 170kNm, combined with an ultimate (hogging) bending moment of 210kNm and an ultimate shear force of 120kN. Assume M₂₅ concrete, Fe₄₁₅ steel and mild exposure conditions.
4. Design a slab for a room of clear internal dimensions 3m x 5m supported on walls of 300mm thickness, with corners held down. Two adjacent edges of the slab are continuous and other two discontinuous. Live load on the slab is 3.2kN/m². Assume floor finish of 1kN/m², Use M₂₀ concrete and Fe₄₁₅ steel. Sketch the details of reinforcements

SECTION-III

5. Design a circular column of diameter 450mm with helical reinforcement subjected to a working load of 1250kN. Use M₂₅ concrete and Fe₄₁₅ steel. The column has unsupported length of 3m and is effectively held in position at both ends, but not restrained against rotation.
6. Explain clearly the design procedure of columns subjected to combined axial load and uniaxial moment with the help of neat sketches.

SECTION-IV

7. Design a square footing for a short axially loaded column of size 300mm x 300mm carrying 630kN load. Use M₂₀ concrete and Fe₄₁₅ steel. SBC of soil is 180 kN/m². Sketch the details of reinforcement.

8. A rectangular column 400 mm x 600 mm carries a live load of 2350 kN. The safe bearing capacity of the soil is 160kN/m^2 . Using M_{20} concrete and Fe_{415} steel, design a rectangular footing to support the column. Sketch the details of the reinforcement.

SECTION-V

9. (a) Describe the common geometrical configurations of staircases.
(b) Explain the basic difference in structural behavior between 'stair slabs spanning transversely' and 'stair slabs spanning longitudinally'.
10. A rectangular simply supported beam of span 6m is 300mm x 650mm in cross section and is reinforced with 3 Nos. of bars of 20mm diameter on tension side at an effective cover of 50mm. Determine the short term deflection due to an imposed working load of 24kN/m (excluding self weight). Assume grade of concrete M_{20} and grade of steel as Fe_{415} .

III B.Tech. I Semester

STRUCTURAL ANALYSIS - I
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

Answer **FIVE** Questions, Choosing **ONE** Question from each section
All Questions carry equal marks

SECTION-I

1. A cantilever beam is subjected to the loads as shown in Fig.1. Find the deflection and slope at the point of action of concentrated load. Also find the maximum deflection and maximum slope. Adopt $E = 200 \text{ kN/mm}^2$ and $I = 25 \times 10^6 \text{ mm}^4$.

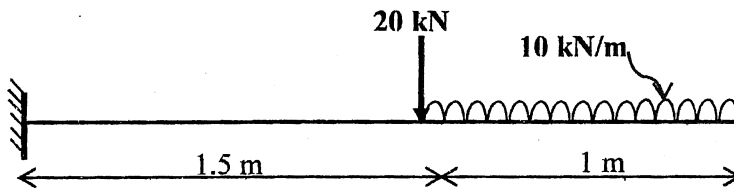


Fig.1

2. Using the conjugate beam method, determine the deflection at the mid-span and the slope at each support of the beam loaded as shown in Fig.2.

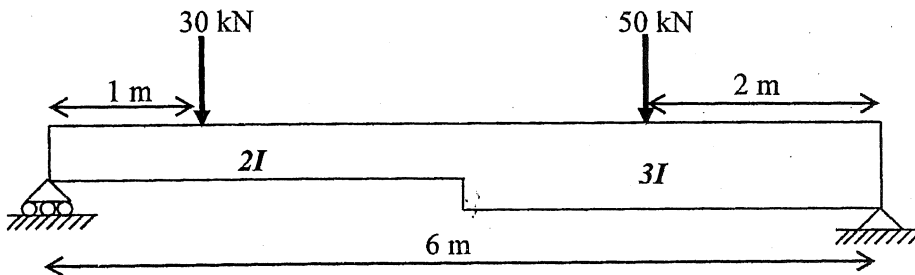
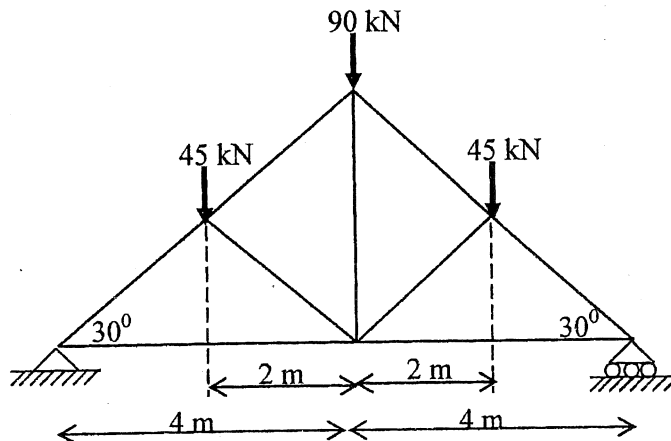


Fig.2

SECTION-II

3. Using method of joints, find the forces in all members of the truss supported and loaded as shown in Fig.3.



4. A simply supported plane truss made up of equilateral triangles of side equal to 4 m is loaded as shown in Fig.4. Analyse the plane truss using tension coefficient method.

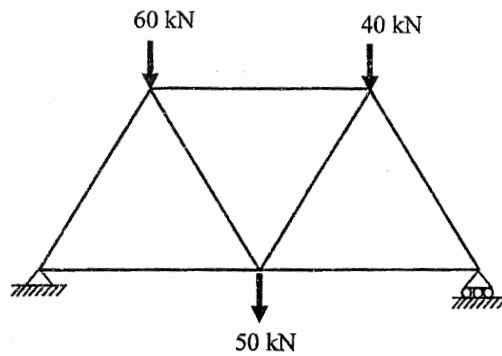


Fig.4
SECTION-III

5. Draw the shear force and bending moment diagrams of the beam of span 4.5 m supported and loaded as shown in Fig.5.

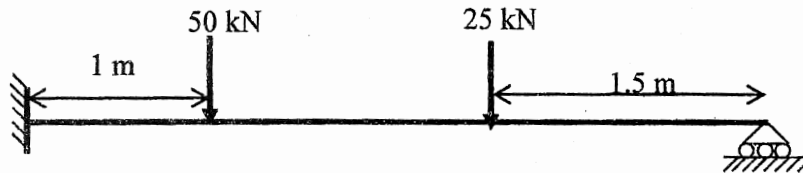


Fig.5

6. Draw the shear force and bending moment diagrams of the beam of span 5 m supported and loaded as shown in Fig.6.

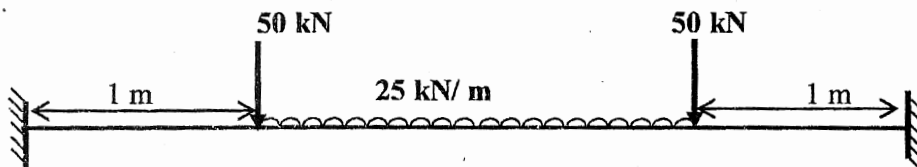


Fig.6

SECTION-IV

7. Draw the shear force and bending moment diagrams of a continuous beam loaded as shown in Fig.7. Assume the flexural rigidity is constant.

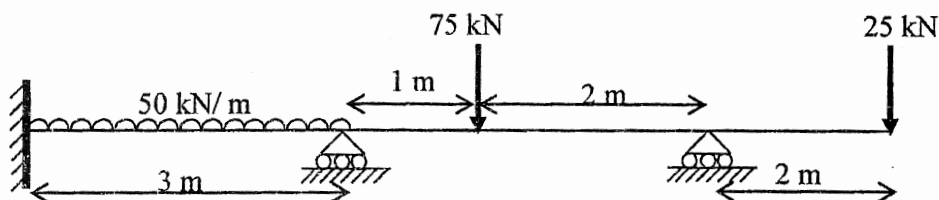


Fig.7

8. Analyse the continuous beam loaded as shown in Fig.8 and also the intermediate support sinks by 10 mm. Draw the shear force and bending moment diagrams. Assume the flexural rigidity is constant.

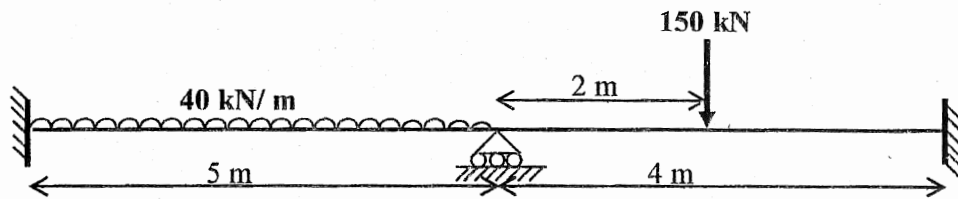


Fig.8

SECTION-V

9. (a) State the explain Castigliano's First theorem.
 (b) Using unit load method, find the mid-span deflection of a beam of span 4.5 m supported and loaded as shown in Fig.9.

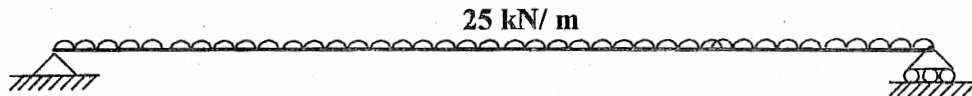


Fig.9

10. Find the vertical deflection at the point of application of the load of a plane steel truss supported as shown in Fig.10. Assume the cross-sectional area of each member is 500 mm^2 .

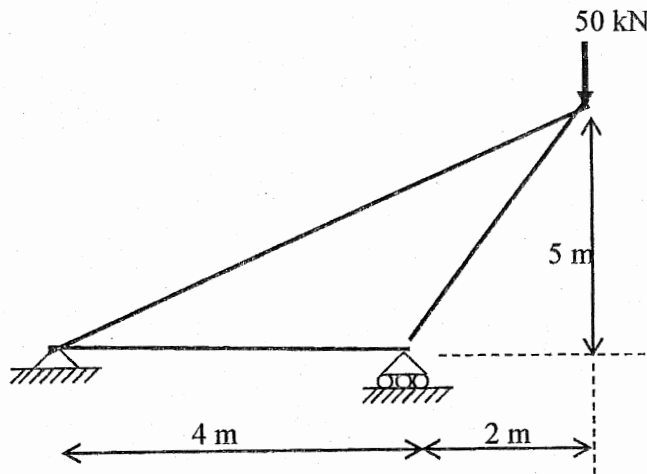


Fig.10

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester
OPERATIONS RESEARCH
(Mechanical Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION - I

1 (a) Write about sensitivity analysis

1 (b) Solve the following LPP

$$\begin{aligned} \text{Maximize } z &= 3x_1 + 2x_2 \\ \text{subjected to } 2x_1 + x_2 &< 40 \\ 2x_1 + 3x_2 &\leq 60 \\ x_1 + x_2 &\leq 24 \\ x_1, x_2 &\geq 0 \end{aligned}$$

2 Solve the following LP - problem by SIMPLEX Method.

$$\begin{aligned} \text{Minimize } z &= x_1 - 3x_2 + 2x_3 \\ \text{Subject to} \\ 3x_1 - x_2 + 3x_3 &\leq 7 \\ -2x_1 + 4x_2 &\leq 12 \\ -4x_1 + 3x_2 + 5x_3 &\leq 10 \\ x_1 ; x_2 ; \text{ and } x_3 &\geq 0 \end{aligned}$$

SECTION - II

3 A company has three plants A,B and C and three ware houses P,Q and R. The transportation cost per unit, demand warehouses and as given in the Table below. Find the optimum transportation plan.

Plants	Ware houses			Capacity
	P	Q	R	
A	50	80	100	400
B	22	90	40	500
C	70	100	55	300
Demand	400	400	400	1200

4

Three buildings are to be added to the college campus. Bids are submitted by five contractors. The bid figures are given in millions of rupees and are as shown in table below.

Contractor \ Bldg.	A	B	C
1	2.90	1.62	-
2	3.10	1.75	2.81
3	3.05	1.80	2.90
4	2.85	1.55	2.75
5	-	1.70	3.0

Find the assignment of buildings to contractors that will result in a minimum total cost for the building program

SECTION - III

5

5. Find the minimum elapsed total time sequence of 2 jobs and 5 machines for the following information by using graphical method.

		Machines				
Job 1	Sequence time (in hrs)	A	B	C	D	E
		2	3	4	6	2
Job 1	Sequence time (in hrs)	C	A	D	E	B
		4	5	3	2	6

6

In a machine shop, 8 different products are being manufactured each requiring time on two machines A and B as given below:

Product	Time (in min) on machine A	Time (in min) on machine B
1	30	20
2	45	30
3	15	50
4	20	35
5	80	36
6	120	40
7	65	50
8	10	20

- i. Determine the optimum sequence of processing of different products in order to minimize the total manufacturing time for all the products.
- ii. The total minimum elapsed time.
- iii. Idle time for machine A and machine B.
- iv. Name and discuss the scheduling model used.

Code : 13ME3104

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester
MATERIAL SCIENCE & METALLURGY
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION - I

- 1 a Draw neat sketch of BCC, FCC unit cells find atomic packing factor
b Differentiate between line defects and point defects
- 2 a Draw burgers circuit to show magnitude and direction of burgers vector on a crystal having edge dislocation.
b With neat sketch explain the deference's between slip and twining

SECTION - II

- 3 a What is creep? Draw the creep curve and explain the stages. What are the mechanisms operating in creep?
b Sketch the stress-strain curve obtained from tension test on a ductile material. What are the properties evaluated using the tension test.
- 4 a Explain briefly Jomney end quench test
b Elaborate Griffiths criterion.

SECTION - III

- 5 a Draw binary isomorphous phase diagram of any two component system (say AB system) and show salient points on it.
b Draw the binary phase diagram of cu-ni.
- 6 Explain experimental method of construction of equilibrium diagram

SECTION - IV

- 7 a What are advantages of alloy steel?
b write short notes on Grey Cast Iron and Malleable Cast Iron

- 8 a Write short notes on stainless steel, high-speed steel
b Explain the properties compositions and applications of aluminum, copper alloys

SECTION - V

- 9 a Discuss the construction of TTT diagram and explain the importance of TTT diagram
b Write short notes on carburizing, nitriding and cyaniding
- 10 a Discuss the various methods of producing metal powders in powder metallurgy.
b Briefly explain the mixing and blending of metal powders.
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III B.Tech. I Semester

KINEMATICS OF MEACHINERY
(Mechanical Engineering)

Time : 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) State (i) completely constrained (ii) incompletely constrained and (iii) successfully constrained motions. Explain and give various examples.
(b) Distinguish between (i) crank and slotted lever mechanism and (ii) Whitworth quick return mechanism.
- 2 (a) State the terms (i) turning pair and (ii) sliding pair. Also explain the mechanism of elliptical trammel specifying the inversion used in it.
(b) What is inversion? Explain the inversions of class 1 four bar chain.

SECTION - II

- 3 (a) Derive the fundamental equation of steering gears, Distinguish between Ackerman and Davis steering gears.
(b) Design a four link mechanism when the motions of the input and output links are governed by a function $y = x^2$ and x varies from 0 to 2 with an interval of 1. Assume θ to vary from 50° to 150° and ϕ from 80° to 160° where θ and ϕ represent the angular positions of input and output links.
- 4 (a) Discuss briefly about Ackermann steering gear.
(b) Explain the terms (i) function generation (ii) path generation and (iii) motion generation.

SECTION - III

- 5 (a) What are centripetal and tangential accelerations? Derive the expression for centripetal acceleration of a link rotating about a fixed axis.
(b) Discuss briefly about Klein's construction.
- 6 (a) When do you consider corioli's acceleration component? Explain how you determine the direction of corioli's component of acceleration with neat sketches?
(b) A crank and rocker mechanism ABCD has the following dimensions. $AB = 0.75\text{m}$, $BC = 1.25\text{m}$, $CD = 1\text{m}$, and $AD = 1.5\text{m}$, $BE = 0.4375\text{m}$. E is the point of the coupler link BC. AD is the fixed link. Crank AB has an angular velocity of 20.95 rad/s counterclockwise at the instant $\angle DAB = 60^\circ$. Find the velocities of points C and E

SECTION - IV

- 7 (a) State and prove the law of gearing for meshing gears.
- (b) Determine the minimum number of teeth and the arc of contact (in terms of module) to avoid interference when (i) gear ratio is 3 and (ii) addendum of the teeth is 0.88 module and the power component is 0.94 times the normal thrust.
- 8 (a) What is interference? Derive the expression for minimum number of teeth of the pinion to avoid interference with rack.
- (b) Two involute gears in mesh have 20° pressure angle. The gear ratio is 3 and the number of teeth on the pinion is 24. The teeth have a module of 6mm. The pitch line velocity is 1.5m/s and the addendum equals to one module. Determine the maximum velocity of sliding.

SECTION - V

- 9 (a) Explain briefly the differences between simple, compound and epicyclic gear trains,
- (b) In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D-E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100rpm, clockwise.
- 10 (a) What is reverted gear train? Where is it used?
- (b) In an epicyclic gear train, an arm carries three gear wheels A, B and C having 48, 24, and 50 teeth respectively. The wheel A meshes with B and B meshes with C. If the arm rotates at 400rpm clockwise, Find
- (i) speed of wheel c when A is fixed
- (ii) speed of wheel A when C is fixed.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

APPLIED THERMODYNAMICS - II
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) Working from first principles, derive an expression for work done on air in a reciprocating compressor in terms of the pressure ratio.
(b) Elaborate about the advantages of inter cooler in a reciprocating air compressors.
- 2 (a) The average indicator and information taken from a 25 x 35 cm, single cylinder, double acting reciprocating air compressor operating at 80 rpm its head end area = 11.1 cm^2 , crank end area = 12.9 cm^2 , length = 7.5 cm, spring scale = 2.5 bar per cm of deflection. Account for the 5 cm dia piston rod and find, (i) The mean effective pressure and the indicated power for each end (ii) The total indicated power.
(b) What is the principle of operation of the reciprocating compressor valves?

SECTION - II

- 3 (a) What is the effect of clearance? Derive the volumetric efficiency of a single stage single acting reciprocating compressor in terms of clearance?
(b) With the help of a velocity diagram derive the pressure ratio equation in a centrifugal compressor?
- 4 A centrifugal compressor used as a supercharger for aero-engines handles 150 kg/min. of air. The suction pressure and temperature 1 bar and 290 K. The suction velocity is 80 m/s. After compression in the impeller the conditions are 1.5 bar 345 K and 220 m/s. Calculate:
i) Isentropic efficiency.
ii) Power required to run the compressor
iii) The overall efficiency of the unit
It may be assumed that K.E. of air gained in the impeller is entirely converted into pressure in the diffuser.

SECTION - III

- 5 (a) Explain Open & Closed gas turbine cycle. What are the applications of the gas turbine plants?
(b) Describe with a neat sketch the working of a constant-pressure combustion gas turbine cycle.

- 6 A turbo-jet engine consumes air at the rate of 60.2 kg/s when flying at a speed of 1000 km/hr.
Calculate: (a) Exit velocity of the jet when the enthalpy for the nozzle is 230 kJ/kg and velocity coefficient of the jet is 0.96
(b) Fuel flow rate in kg/s when air-fuel ratio is 70:1
(c) Thrust specific fuel consumption
(d) Thermal efficiency of the plant when the combustion efficiency is 92% and the calorific value of the fuel is 42000 kJ/kg
(e) Propulsive power & Propulsive efficiency
(f) Overall efficiency.

SECTION - IV

- 7 (a) Why ammonia is not used in domestic refrigerator?
(b) Mention the desirable properties required for refrigerants to be used in vapour absorption refrigeration system.
- 8 (a) Prove the equation of maximum C.O.P of a vapour absorption system with usual notations.
(b) Why in practice a throttle valve is used in V.C.R. system rather than an expansion cylinder to reduce pressure between condenser and the evaporator?

SECTION - V

- 9 (a) Define wet bulb temperature, dew point and relative humidity.
(b) A room 7 m X 4 m X 4 m is occupied by an air-water vapour mixture at 38°C. The atmospheric pressure is 1 bar and the relative humidity is 70%. Determine the humidity ratio, dew point, mass of dry air and mass of water vapour. If the mixture of air-water vapour is further cooled at constant pressure until the temperature is 10°C. Find the amount of water vapour condensed.
- 10 The following data refer to an air conditioning system for industrial process for hot and wet summer conditions:
Outdoor conditions = 30°C DBT and 75% RH.
Required conditions = 22°C DBT and 70% RH.
Amount of out-door air supplied = 200 m³/min.
Coil dew point temperature = 14°C.
If the required condition is achieved by first cooling and dehumidifying and then by heating,
Find: (i) The capacity of the cooling coil and its by-pass factor.
(ii) The capacity of the heating coil and surface temperature of the heating coil if the bypass factor is 0.2.

Code : 13SH3101

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech I Semester

**ECONOMICS & ACCOUNTANCY
(Mechanical Engineering)**

Time : 3 hours

Max Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
All questions carry equal marks*

SECTION-I

- 1 What are the important features of economics ? Explain.
2. Explain the law of demand ? Also explain its important assumptions.

SECTION-II

- 3 Describe the law of variable properties.
- 4 (a) What is breakeven point? Explain its uses.
(b) Explain the difference between fixed cost and variable cost.

SECTION-III

- 5 What are the different market structures ? Discuss.
- 6 (a) What is meant by price discrimination ?
(b) Define oligopoly and state the features.

SECTION-IV

- 7 What do you understand by sole proprietorship ? Explain its merits and limitations.
- 8 Explain about the differences between private company and public company

SECTION-V

- 9 Explain the purpose and significance of financial statement analysis.
- 10 (a) Explain about net present value method.
(b) Explain the concept of operating cycle.

Code : 13ME3102

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester
ENGINEERING METROLOGY
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) Distinguish between Line Standard and end Standard.
- (b) Explain the concept of tolerance, interchangeability and selective assembly.
- 2 Explain the Taylor's principal of limit gauging, with reference to gauging of rectangular holes.

SECTION - II

- 3 Describe the constructional details of an Angle Decker and explain how it is used to measure the angle?
- 4 Explain the construction and working principle of Johansson Mikrokator comparator.

SECTION - III

- 5 Explain the use of the interferometer in measuring flatness of surfaces with examples.
- 6 Explain with a neat sketch the working of Talysurf instrument for surface finish measurement

SECTION - IV

- 7 What are the different elements of a screw thread? What are the instruments used for the measurement of the elements of the screw thread?
- 8 With the help of a neat sketch, describe the construction and working of a pitch-measuring instrument.

SECTION - V

- 9 Explain various instruments required for performing the alignment tests on machine tools.
- 10 Describe the features of the Coordinate Measuring Machine.

Code :13EE3109

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

**ELECTROMECHANICAL ENERGY CONVERSION - III
(Electrical & Electronics Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

** * **

SECTION - I

- 1 (a) Derive an expression for the generated emf in synchronous machines.
(b) Write in detail about the MMF space wave of three phase distributed winding.
- 2 (a) Enumerate various methods used for minimizing harmonics in turbo-alternators.
(b) Calculate the rms value of induced emf per phase of a 10 pole, 3-phase, 50Hz alternator with 2 slots per pole per phase and 4 conductors per slot. Assume coil span of 150°. Flux per pole has a fundamental component of 0.12 Wb and a third harmonic component of 20% of the fundamental. What is the value of line-to-line emf?

SECTION - II

- 3 Compare synchronous impedance and ampere-turns methods of predetermining voltage regulation of an alternator.
- 4 Describe the slip test method for the measurement of X_d and X_q of synchronous machine

SECTION - III

- 5 (a) Briefly explain the influence of varying excitation on the power factor, armature current and load angle of a synchronous generator connected to an infinite bus.
(b) Two identical 2 MVA alternators operate in parallel. The governor of first machine is such that the frequency drops uniformly from 50 Hz on no-load to 47.5 Hz on full-load. The corresponding uniform speed drop of second machine is 50 Hz to 48 Hz. How will they share a load of 3 MW.
- 6 (a) What is an infinite bus? Mention three conditions to be satisfied prior to synchronizing an alternator to an infinite bus
(b) A 10 MVA, 10kV, 3-phase, 50 Hz, 1500 rpm alternator is paralleled with others of much greater capacity. The moment of inertia of the rotor is 2×10^5 kg-m² and the synchronous reactance of the machine is 40%. Calculate the frequency of oscillation of the rotor.

SECTION - IV

- 7 (a) What is meant by constant power circle for synchronous motor? How is it derived?
- (b) A 6.6 kV star connected 3-phase synchronous motor works at constant voltage and constant excitation. Its synchronous reactance is $20\Omega/\text{ph}$, neglect resistance. When the input is 1000 kW, the pf is 0.8 leading. Find the pf when the input is increased to 1500 KW.
- 8 (a) Explain the different methods of starting 3-phase synchronous motors.
- (b) A factory takes 600 KVA at a lagging power factor of 0.7. A synchronous motor is to be installed to raise the power factor of 0.9 lagging when the motor is taking 200 KW, calculate the corresponding kilovolt amperes taken by synchronous motor and the power factor at which the motor will be operating.

SECTION - V

- 9 Describe the additional constructional features of a universal motor compared to a DC series motor.
- 10 Explain the construction, working and applications of variable-reluctance stepper motor.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

ELECTRICAL MEASUREMENTS
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

SECTION - I

- 1 Derive the torque equation of and explain the operation of a PMMC instrument with neat diagram.
- 2 a) Describe the constructional details and working of a moving iron Repulsion type meter.
b) The spring constant of a 3000 V electrostatic voltmeter is 7.06×10^{-6} Nm/rad. The FSD of the instrument is 80 degrees. Assuming the rate of change of capacitance with the angular deflection to be constant over the operating range. Calculate the total change of capacitance from zero to full scale.

SECTION - II

- 3 a) Explain the construction and working of a two element wattmeter.
b) Two wattmeter's are connected to measure the input to a balanced three phase circuit indicate 2000W and 500W respectively. Find the power factor of the circuit
 - i) When both reading are positive
 - ii) When the latter is obtained after reversing the connections to the current coil of one of the instrument.
- 4 a) Explain the theory and operation of Single phase induction type energy meter
b) A 220 V, 5A energy meter is tested at its marked ratings. The resistance of the pressure coil is 8800 ohms and that of current coil is 0.1 ohms. Calculate the power consumed when testing the meter with phantom loading with current circuit excited by a 6V battery.

SECTION - III

- 5 a) What are the differences between power transformers and instrument transformers
b) A single phase PT has a turns ratio of 3810/63. The nominal secondary voltage is 63V and the total equivalent resistance and leakage reactance referred to the secondary side are 2 ohms and 1 ohms respectively. Calculate the ratio and phase angle errors when the transformer is supplying a burden of $100 + j200$ ohms.
- 6 a) Explain the construction and working of an Alternating filed type MI power factor meter.
b) Explain the construction and working of a Weston frequency meter.

SECTION - IV

- 7 a) Explain about the process of calibration of the ammeter, voltmeter and wattmeter.
b) A basic slide wire potentiometer has a working battery voltage of 3 volts with negligible internal resistance. The resistance of slide wire is 400 and its length is 200 cm. A 200 cm scale is placed along the slide wire. The slide wire has 1 mm scale divisions and it is possible to read upto of a division. The instrument is standardized with 1.018 V standard cell with sliding contact at the 101.8 cm mark on scale. Calculate:
i. Working current
ii. The resistance of series rheostat
- 8 a) Explain about the standardization Drysdale -Tinsley AC Potentiometer
b) Explain about Gall-Tinsley co-ordinate type AC Potentiometer

SECTION - V

- 9 a) Describe with the help of diagram the kelvins- double bridge for low resistance measurements
b) Describe with the help of diagram the loss of charge method for determining the insulation resistance of a length of a cable.
- 10 a) Explain how the self-inductance can be measured by using Anderson bridge and deduce the equations when the bridge is under balanced condition.
b) Describe with the help of diagram of DeSauty bridge for the measurement of unknown capacitance.

III B.Tech. I Semester**POWER SYSTEMS - I**
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

Answer **FIVE** Questions, Choosing **ONE** Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 a. Explain different types of primary distribution systems and secondary distribution systems.
- b. A two wire distributor is loaded as shown in figure 11b. The voltage at the two ends is 230V and 230V respectively. The distance between sections are given in meters. Determine the cross section of the conductor for a minimum consumer's voltage of 220V.

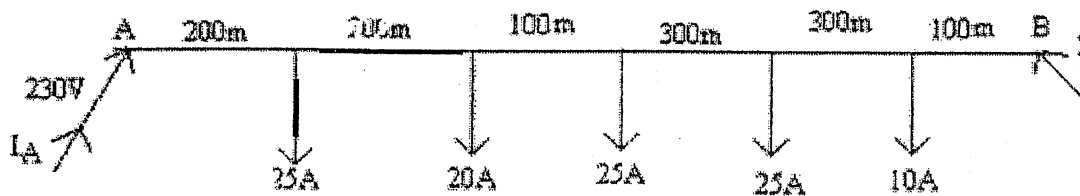
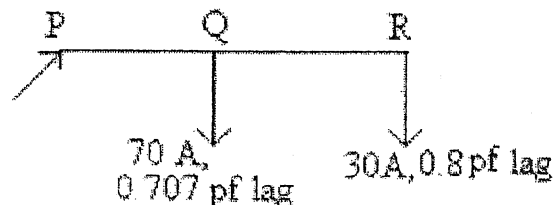


Figure 11b

- 2 a. Explain briefly the various system of AC distribution and write the differences between DC distribution system and AC distribution systems.
- b. A single phase distributor PQR fed at P is as shown in Figure 4b. The power factors are lagging and expressed relative to the voltage at the far end. The impedances between the sections PQ and QR is $(0.1 + j 0.15)$. If the voltage at the far end is 230 V, calculate the voltage at the supply end and also its phase angle with respect to the far end.

**SECTION - II**

- 3 a. Develop an expression for the inductance of a single phase transmission line taking into account the internal flux linkages. Assume the conductors are solid.
- b. Explain skin and proximity effects on transmission line.

- 4 Derive an expression for electrical potential and hence deduce the formula for capacitance for the following cases:
- Single phase 2-conductor line
 - 3-phase unsymmetrical spacing, but transposed.

SECTION - III

- 5
- Define critical disruptive and visual critical disruptive voltages and derive their formulas.
 - A 3- Phase line has a conductor diameter of 1.6 cm and spaced equilaterally 2.5m apart. If the dielectric strength of air is 30KV/cm (peak) determine the disruptive critical voltage at which corona will occur. Take air density factor=0.96 and irregularity factor =0.94
- 6
- Discuss various methods for improving the string efficiency in a string of insulators.
 - A three-phase 66KV transmission line is carried by strings of 5 suspension insulators. The capacity of each unit insulator to the capacity relative to earth is 4:1. Calculate the potential across each unit and the string efficiency. Assume that there is no leakage.

SECTION - IV

- 7
- Derive the formula for sag for unequal supports.
 - An over Head line has a span of 200m between level supports. The conductor diameter is 4cm and weights 0.65kg/met the allowable tension is 550kg. Calculate maximum sag
- 8
- Write the advantages of straining charts.
 - An overhead transmission line has a span of 240m between level supports. Calculate the maximum sag if the conductor weights 727kgf/km and has a breaking strength of 6880kgf. Allow a factor of safety of 2. Neglect wind and ice loading. Derive the formula used.

SECTION - V

- 9
- Derive a formula for capacitance of a single core cable.
 - A single core cable has an inner diameter of 5cms and a core diameter of 1.5cm. Its paper dielectric has a working maximum dielectric stress of 60 kV/cm. Calculate the maximum permissible line voltage when such cables are used on a 3-phase power system.
- 10
- State the classification of cables (according to voltage) and discuss their general construction.
 - A 66-KV single core lead sheathed cable Is graded by using two dielectrics of relative permitting 5 and 3 respectively. Thickness of each dielectric is 1 cm. Determine the maximum electrostatic force in the two dielectrics.

Code :13CE3107

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

ENVIRONMENTAL STUDIES

(Common to EEE & ECE)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

* * *

SECTION - I

- 1 (a) Discuss the importance of education on environmental issues and concerns
(b) What are the characteristic feature of an Ecosystem
- 2 (a) What are the different types of values of biodiversity
(b) Explain the efforts taken towards conservation of bio-diversity in India

SECTION - II

- 3 (a) List the causes and effects of soil erosion
(b) What are the various pros and cons of modern agriculture practices
- 4 (a) Discuss the uses and consequences of over exploitation of forest resources
(b) Explain the importance of rainwater harvesting

SECTION - III

- 5 (a) What are the sources, effects of air pollution
(b) Define marine pollution and classify major sources of marine pollution
- 6 (a) Discuss the importance of recycling and reuse
(b) Explain the causes and consequences of thermal pollution

SECTION - IV

- 7 (a) Explain the important quality parameters for drinking water
(b) Discuss the importance of environmental impact assessment
- 8 (a) What is sustainable development and discuss various measures of sustainable development
(b) List out some social issues and their impact in India

SECTION - V

- 9 (a) Summarize the regulations framed under Wildlife act
(b) Outline the silent valley project
- 10 (a) Discuss the environmental implications due to aquaculture
(b) Write a brief note on pollution problems on Taj Mahal

III B.Tech. I Semester
LINEAR CONTROL SYSTEMS
 (Common for EEE & ECE)

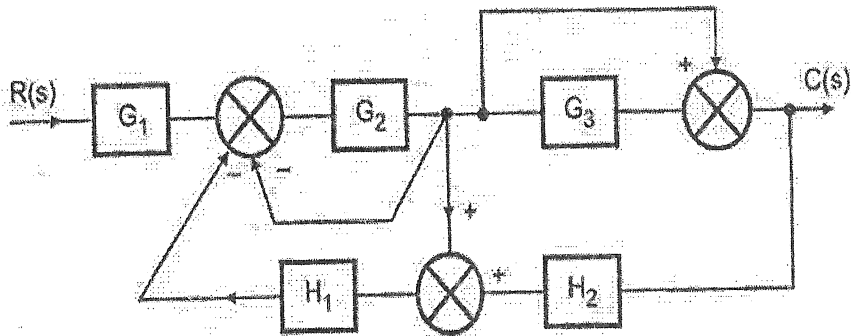
Time: 3 hours

Max. Marks: 60

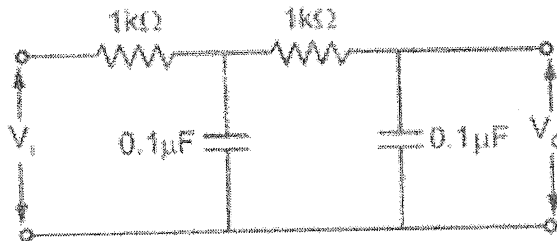
Answer FIVE Questions, Choosing ONE Question from each section
 All Questions carry equal marks

SECTION-I

1. (a) Compare Open loop and closed loop control systems with suitable examples.
- (b) Reduce the given block diagram and hence obtain the transfer function.

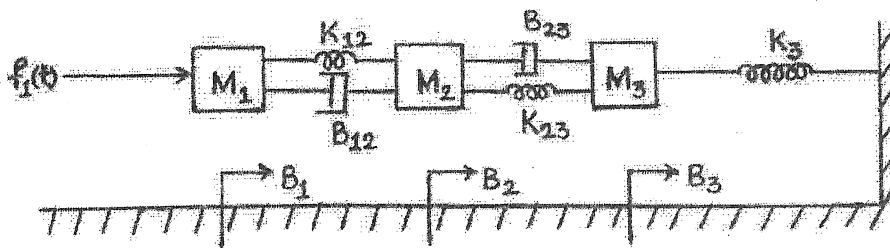


2. (a) Mention advantages and disadvantages of open loop & closed loop control system
- (b) What is a transfer function? Determine the transfer function of the following system

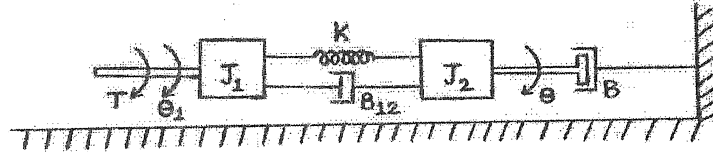


SECTION II

3. (a) Write short notes on mechanical translational system & Rotational System
- (b) Write differential equations governing the mechanical system shown in the figure and hence find transfer function of the given system



4. (a) Derive the transfer function of armature controlled dc servomotor with neat sketch.
 (b) Write the differential equations governing the mechanical rotational system shown in the following figure & determine $\frac{\theta(s)}{T(s)}$.



SECTION III

5. (a) Define the following time domain specifications of second order system, when it is subjected to a unit step input.
 (i) Setting time (ii) Peak time (iii) Peak over shoot
 (b) Find all time domain specifications for a unity feedback system, whose open loop transfer function is given by $G(s) = \frac{10}{s(s+2)}$. Also given a step input of 12 units.
 6. Sketch the complete root locus for the following system

$$G(s) = \frac{K}{s(s^2 + 8s + 17)}$$

SECTION IV

7. (a) Briefly explain about the following frequency domain specification
 i) Peak resonance ii) Resonant frequency
 iii) Bandwidth iv) Cut-off rate
 (a) Derive bandwidth to analyse the system in frequency domain.

8. Given $G(s) (H(s) = \frac{K(1 + 0.1s)}{(s + 1)(1 + 0.02s)(s + 40)(s + 200)}$

Draw bode plot for $K = 10,000$ and determine gain margin & phase margin. Discuss the stability of the system.

SECTION V

9. (a) What is compensation? What are the different types of compensators
 (b) Explain the different steps to be involved for the design of compensator using Bode plot
 10. Design lag compensator for a unity feedback system having an open loop transfer function $G(s) = \frac{K}{s(s + 1)(0.2s + 1)}$, so as to meet the requirements of velocity constant $K_v = 8$ and phase margin = 40° .

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester
ANALOG IC APPLICATIONS
(Common to EEE & ECE)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks
* * *

SECTION - I

- 1 (a) What are the features of 741 op - amp and also draw the pin diagram? explain
(b) Explain the operation of op - amp by using block diagram
- 2 (a) What is a practical op - amp? Draw its equivalent circuit? Explain
(b) Analyze the Single input balanced output configuration of differential amplifier using DC & AC Equivalent circuit diagrams

SECTION - II

- 3 (a) Explain about Sample and Hold circuit
(b) What is the need of Instrumentation Amplifier? Where it is used? Explain? Obtain the expression for V_o .
- 4 (a) What is the function of precision rectifier?
(b) Why the Logarithmic Amplifier is required? Derive the expression for output

SECTION - III

- 5 (a) Explain the operation of Monostable multivibrator using 555 timer. Derive the expression for time delay?
(b) Design an astable multivibrator using 555 timer to produce 70% Duty cycle.
- 6 (a) Draw the circuit of PLL as frequency multiplier and explain its working
(b) How 555 timers can be used as a Schmitt trigger? Explain

SECTION - IV

- 7 (a) What are the advantages of active filters. Explain the different configurations of active filters. Discuss their merits and demerits
- (b) Sketch the circuit diagram of band elimination filter and design a wide band reject having $f_H=200\text{Hz}$ and $f_L=1\text{KHz}$
- 8 (a) How filters are classified? Explain about pass band and stop band of a filter?
- (b) Derive the expression for the transfer function of 2nd order High pass filter

SECTION - V

- 9 (a) Explain the operation of a Successive Approximation type analog to digital converter
- (b) Calculate the no. of bits required to represent a full scale voltage of 10V with a resolution of 5mV approximately
- 10 (a) Draw a schematic diagram of a D/A converter. Use resistance values whose ratios are multiples of 2 and Explain the operation of the converter
- (b) Draw the block diagram of a converting 4-bit A/D converter and explain its operation and Sketch the output waveform

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

ANTENNA & WAVE PROPAGATION
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) What are different transmission line parameters and explain?
(b) A lossless transmission line is 80 cm long and operates at a frequency of 600 MHz. The line parameters are $L = 0.25 \mu\text{H/m}$ and $C = 100 \text{pF/m}$. Find the characteristic impedance, the phase constant, the velocity on the line, and the input impedance for $Z_L = 100 \Omega$
- 2 (a) Derive the transmission line equations.
(b) Define the following terms:
(i) SWR (ii) Reflection coefficient

SECTION - II

- 3 (a) Derive field expressions for the alternating current element.
(b) Define effective aperture of an antenna and calculate the maximum effective aperture of an antenna which is operating at a wavelength of 2 meters and has a directivity of 100.
- 4 (a) Derive field expressions for a monopole dipole antenna.
(b) Explain the following terms with respect to antenna.
(i).Radiation Pattern (ii)Antenna Gain (iii) BWFN

SECTION - III

- 5 (a) Describe about broadside and endfire arrays.
(b) Explain about the principle of pattern multiplication.
- 6 (a) Explain about array of n isotropic sources of equal amplitude and spacing and draw the radiation pattern of four isotropic sources in the case broadside array
(b) Describe about binomial array and list out the drawbacks in using binomial array.

SECTION - IV

- 7 (a) Discuss about the sommerfield analysis of ground wave propagation.
(b) Derive an expression for the field strength of tropospheric wave.
- 8 (a) What are the factors in affecting the propagation of the surface wave?
(b) Explain about the refraction of radio wave in the troposphere.

SECTION - V

- 9 (a) Explain about the structure of Ionosphere.
(b) Describe about the duct propagation.
- 10 (a) Explain about the propagation of radio waves by the Ionosphere.
(b) Write short note on
(i) Skip Distance
(ii) MUF
(iii) Virtual Height
(i) Critical frequency

III B.Tech. I Semester

DIGITAL COMMUNICATIONS
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) Define Entropy, Joint Entropy, and Conditional entropy. Derive a relation between Them.
(b) A source generates four messages m_0, m_1, m_2 & m_3 with probabilities $1/3, 1/6, 1/4$ and $1/4$ respectively. The sources are statistically independent. Calculate entropy of the source.
- 2 (a) Describe Huffman Code. What is the efficiency of that code?
(b) A Source is transmitting six messages with probabilities 0.3, 0.25, 0.15, 0.12, 0.10 & 0.08 respectively. Find the Binary Huffman source code for the above messages and Coding Efficiency.

SECTION - II

- 3 (a) Explain different types of pulse modulation techniques with neat diagrams.
(b) What is the working principle of PCM transmitter with a neat block diagram.
- 4 (a) With neat block diagrams explain the transmitter and receiver mechanisms in differential pulse code modulation (DPCM)
(b) Explain the working of Delta modulation (DM) system with neat block diagram and Mention its limitations.

SECTION - III

- 5 (a) What are the different M-array signaling schemes and how they are differ from binary signaling schemes.
(b) Explain the Nyquist criterion for base band data transmission of signals.
- 6 (a) Design the transmitters and receivers for optimum performance of data transmission over the channels.
(b) What is an eye pattern? and how it is helpful for data transmission over baseband channels.

SECTION - IV

- 7 (a) Derive the expression for probability of error in the noncoherent FSK signals
(b) With the help of block diagram explain QPSK transmitter and receiver

- 8 (a) Compare ASK, FSK and PSK systems.
(b) What are the advantages and disadvantages of DPSK? What is the bandwidth requirements of DPSK systems.

SECTION - V

- 9 (a) With a suitable block diagram explain how the block codes encoding operation Can be implemented.
(b) Explain error detection and correction capabilities of cyclic codes
- 10 Draw the state diagram, tree diagram, and trellis diagram for $k=3$, rate $1/3$ code generated by $g_1(x)= 1+x^2$, $g_2(x)= 1+x$ and $g_3(x)= 1+x+x^2$.

III B.Tech. I Semester

ELECTRONIC MEASUREMENTS & INSTRUMENTATION
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 (a) What are the three general classes of errors in instruments? Explain them in detail and how to minimize (or) overcome these errors?
(b) A set of independent voltage measurements taken by four observers was recorded as 117.02 V, 117.11 V, 117.08 V and 117.03 V. Calculate
(i) the average voltage (ii) the range of error.
- 2 (a) Explain the operation of an DC Ammeter and derive the expression for shunt resistance.
(b) A 1- mA meter movement with an internal resistance of 100Ω is to be converted in to a 0 – 100mA ammeter. Calculate the value of shunt resistance required.

SECTION - II

- 3 (a) Explain the sweep-frequency generator with block diagram.
(b) Draw the block diagram of a function generator that generate square, triangular and sine wave and explain.
- 4 (a) Explain with the help of a block diagram, the working of a harmonic distortion analyzer.
(b) Draw the block diagram of spectrum analyzer and explain.

SECTION - III

- 5 (a) Draw and explain the block diagram of the vertical section of an oscilloscope.
(b) With the help of a schematic diagram, explain the generation of a triggered Time base for an oscilloscope.
- 6 (a) Draw the block diagram of a digital storage oscilloscope and explain its operation.
(b) Describe how the following measurements can be made with the use of CRO:
(i) Frequency (ii) phase angle

SECTION - IV

- 7 (a) Explain the working of Wheat stone bridge and derive its balance condition. How the unknown resistance can be measured using Wheat stone bridge.
(b) Draw the basic circuit diagram for Q-meter, explain its operation, and write the equation for Q-factor.

- 8 (a) Explain the process of measuring the capacitance using the Schering bridge.
(b) Derive the expression for frequency of Wien bridge with circuit diagram

SECTION - V

- 9 (a) What is the role of transducer in Electronic Instrumentation? Discuss the classification Of Transducers.
(b) Explain how temperature can be measured using Thermocouple.
- 10 (a) Explain the Data Acquisition System with neat block diagram.
(b) Explain the operation of the following.
i) LVDT ii) Piezoelectric Transducer

Code : 13CS3106

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

**SOFTWARE PROJECT MANAGEMENT
(Computer Science & Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

SECTION - I

1. (a) Explain the activities of Software Project Management.
(b) Explain Software Project Needs
2. (a) Discuss step wise project planning with an example in detail.
(b) Explain which factors decides the success of a project.

SECTION - II

3. (a) Explain managing multiple projects.
(b) Explain various scheduling problems and how you diagnose them.
4. (a) Explain in detail about inspections.
(b) What are the attributes should be verified during code review

SECTION - III

5. (a) Explain in detail about requirements Elicitation
(b) Explain refractory with an example.
6. (a) How do you diagnose software requirement problems.
(b) Write a short note on automation.

SECTION - IV

7. (a) What are the differences between test plans and test cases.
(b) Write a short note on test automation.
8. (a) How do you justify that software testing effective.
(b) Explain the significance of performance testing.

SECTION - V

9. (a) What are the steps involved to manage your team.
(b) Explain management issues in outsourced projects.
10. (a) Explain the steps involved in collaborate with the vendor.
(b) What are the steps needed to improve the software process.

III B.Tech. I Semester

**THEORY OF COMPUTATION
(Computer Science & Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

- 1 (a) Write a short note on Non-Deterministic Finite Automation.
(b) Design a DFA accept the following strings over the alphabets {0, 1} the set of all strings that contain a pattern 11. Prove this using Mathematical Induction.
- 2 (a) Prove the equivalence of NFA and DFA using subset construction.
(b) Consider the finite automata transition table shown below with $\{0, 1\}$ = states inputs
0 1
0 q 2 q 1 q
1 q 3 q 0 q
2 q 0 q 3 q
3 q 1 q 2 q
Find the language accepted by the finite automata.

SECTION - II

- 3 (a) Let r be a regular expression. Prove that there exists an NFA with ϵ -transition that accepts $(r)^*$.
(b) Construct the regular expression to the transition diagram.
- 4 (a) Construct a NFA for regular expression $(a/b)^*abb$ and draw its equivalence DFA.
(b) Construct the minimal DFA for the regular expression $(a/b)^*bbaab$.

SECTION - III

- 5 (a) Let L is a context free language. Prove that there exists a PDA that accepts L .
(b) Obtain a Greibach normal form grammar equivalent to the context free grammar
0/ $ASS \rightarrow$
1/ $SSA \rightarrow$
- 6 (a) Convert the following grammar into CNF $S \rightarrow cBA, S \rightarrow A, A \rightarrow cB, A \rightarrow AbbS, B \rightarrow aaa$
(b) Explain the closure properties of context free languages.

SECTION - IV

- 7 (a) State and prove the Pumping lemma for CFL.
(b) Show that the language $L = \{a^n b^n c^n d^n / n \geq 0\}$ is not CFL.
- 8 (a) Construct the PDA accepting the language $\{(ab)^n / n \geq 1\}$ by the empty stack.
(b) Design PDA for all language $L = \{a^{3n} b^n / n \geq 0\}$ and simulate its action on the input string $aaa aa bb$.

SECTION - V

- 9 (a) Explain in brief about the programming Techniques for TM.
(b) Show that language L and its complement \bar{L} are both recursively enumerable then L is recursive.
- 10 (a) Explain Halting problem is it decidable or un-decidable problem.
(b) State and prove the Post's correspondence problem.

III B.Tech. I Semester

OBJECT ORIENTED ANALYSIS AND DESIGN
(Computer Science & Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

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SECTION - I

- 1 (a) Write about structural things of UML vocabulary. Give UML notation.
(b) What are principles of modeling?
- 2 (a) Illustrate the conceptual model of UML in detail.
(b) What is UML? Elaborate the object oriented design with an example.

SECTION - II

- 3 Discuss how classes can be used for modeling the non software things and modeling primitive types.
- 4 (a) Discuss about types and roles.
(b) Define an object. Mention common uses of objects.

SECTION - III

- 5 (a) What is a class diagram? What are the common properties and uses of class diagrams?
(b) With reference to class diagrams, enumerate the steps to forward engineer.
- 6 (a) Draw and explain the class diagram for an ATM bank system.
(b) Explain about links and associations in detail.

SECTION - IV

- 7 Draw the usecase diagram and the activity diagram for an online airline reservation system. Summarize the purpose of each usecase, actor, and its importance. Briefly explain various activity states and action states in the activity diagram.
- 8 (a) Explain sequence diagram with suitable example.
(b) How to model the requirements of a system?

SECTION - V

- 9 Define an event and a signal. Explain briefly about the common modeling techniques of events and signals.
- 10 (a) Compose the state chart diagram for unified library application.
(b) What are components? Show the stereotypes that apply to components.

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

DATA COMMUNICATIONS AND COMPUTER NETWORKS
(Computer Science & Engineering)

Time : 3 hours

Max. Marks :60

Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks

* * *

SECTION - I

- 1 Write short notes on the following
(a) Twisted Pairs (b) Fiber Optics
- 2 Explain ISO reference model with neat sketch.

SECTION - II

- 3 Write short notes on
(a) Ethernet (b) Error Detection Codes
- 4 Briefly explain ALOHA & CSMA Protocols.

SECTION - III

- 5 Describe the following in detail
(a) Leaky and Token Buckets (b) Resource Reservation Protocol
- 6 Explain Shortest Path Routing Algorithm with example.

SECTION - IV

- 7 Explain what are the Services provided by Transport Layer?
- 8 What is Connection oriented Protocol ? Explain the concept of TCP/IP?

SECTION - V

- 9 Describe E-mail architecture and supporting services.
- 10 Write short notes about the following
(a) SNMP (b) SMTP

Code : 13CS3101

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech I Semester

**DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science & Engineering)**

Time : 3 hours

Max Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section
All questions carry equal marks*

SECTION-I

- 1 (a) What are the basic techniques for design of efficient algorithms? Give short notes about each technique.
- (b) Discuss the randomized Quick sort algorithm with suitable example.
2. (a) Write the code for Merge Sort. Explain the working with an example.
- (b) Distinguish between Divide and Conquer and Backtracking approaches.

SECTION-II

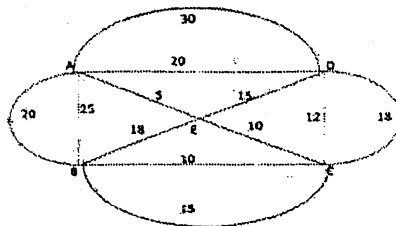
- 3 (a) What is Greedy Method? Explain with an example.
- (b) Explain Dijkstra's shortest path with an example.
- 4 (a) Explain in detail Minimum Spanning Trees with an example.
- (b) Discuss in detail Reliability Design Problem.

SECTION-III

- 5 Define binary search tree. Give recursive algorithms that perform preorder and post order tree walks in time on a tree of n nodes . Justify your answer by a suitable example.
- 6 (a) Write the pseudo- code of DFS and explain with the help of a graph.
- (b) Discuss in detail 8 –Queen's problem with an example.

SECTION-IV

- 7 (a) State the difference between branch – and – bound technique and dynamic programming
- (b) Apply Travelling Salesman problem to the graph given below



- 8 Explain 0/1 knapsack problem in the context of branch –and –bound technique. How it is different from dynamic programming 0/1 knapsack problem? Draw the portion of the state space tree generated by LCBB (Last In First Out based branch –and –bound) for the knapsack instance $n=5$, $m=12$, $(p_1, p_2, \dots, p_5) = (12, 14, 8, 6, 3)$ and $(w_1, w_2, \dots, w_5) = (2, 4, 3, 6, 2)$, where the symbols has their own meaning.

SECTION-V

- 9 (a) Distinguish between NP-Complete and NP-Hard problems.
(b) Prove that clique is NP complete.
- 10 (a) Discuss and trace PRAM algorithm to merge the following two sorted lists using 'processors.

1	5	7	9	13	17	19	23
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2	4	8	11	12	21	22	24
---	---	---	----	----	----	----	----

- (b) Explain the PRAM model for parallel computation and how they handle read conflict based on various PRAM models.

Code : 13CS3103

B.TECH. DEGREE EXAMINATION, NOVEMBER 2018

III B.Tech. I Semester

**PRINCIPLES OF PROGRAMMING LANGUAGES
(Computer Science & Engineering)**

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section
All Questions carry equal marks*

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SECTION - I

- 1 (a) Explain reasons to study programming languages.
(b) Explain about Parse Trees with neat diagrams.
- 2 (a) Explain about Unambiguous grammar with examples.
(b) What are the formal methods for describing the syntax of programming languages?

SECTION - II

- 3 (a) Explain about Axiomatic Semantics in detail.
(b) Explain about Denotational Semantics
- 4 (a) Explain about Lexical Analysis
(b) Explain about Recursive Decent Parsing

SECTION - III

- 5 (a) Discuss about Character String types.
(b) Explain about Co-routines.
- 6 (a) Explain about types of Calls in detail with examples.
(b) Explain about Arrays.

SECTION - IV

- 7 (a) Explain about fixed mode Assignments
(b) Explain the concepts of Abstractions and Encapsulation.
- 8 (a) Design Issues for OOL
(b) Discuss about Implementation of Object Oriented constructs.

SECTION - V

- 9 (a) Explain about Exception handling in C++
(b) Explain about importance of functional programming languages.
- 10 (a) Explain the features of LISP
(b) Explain about the Applications of functional programming languages.

