

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, June 2023

II B.Tech. II Semester

FLUID MECHANICS - II
(Civil Engineering)

Time : 3 hours

Max Marks: 60

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

SECTION - I

- 1 (a) Explain with neat sketch: i) Siphon, and ii) Water hammering in pipes.
- (b) A pipe line of 0.6m diameter is 1.5km long. To increase the discharge, another line of the same diameter is introduced parallel to the first in the second half of the length. Neglecting minor losses, find the increase in discharge if $4f = 0.04$. The head at inlet is 300mm.
2. (a) Describe the conditions to be satisfied for any network of pipes.
- (b) Determine the difference in the elevations between the water surface in the two tanks which are connected by a horizontal pipe of diameter 300 mm and length 400 m. The rate of flow of water through the pipe is 300 litres/sec. Consider all losses and take the value of $f=0.008$.

SECTION - II

- 3 (a) Derive Hagen- Poiseuille equation for study laminar flow through a circular pipe.
- (b) A laminar flow is taking place in a pipe of diameter of 200 mm. The maximum velocity is 1.5 m/s. Find the mean velocity and the radius at which this occurs. Also calculate the velocity at 4 cm from the wall of the pipe.
- 4 (a) Explain the concept of hydro-dynamically smooth and rough boundaries?
- (b) A fluid of viscosity 0.5 poise and specific gravity 1.20 is flowing through a circular pipe of diameter 100 mm. The maximum shear stress at the pipe wall is given as 147.15 N/m², find: (a) the pressure gradient, (b) the average velocity, and (c) the Reynold's number of the flow.

SECTION - III

- 5 (a) Explain the phenomenon of separation for flow over a curved surface.
- (b) Find the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$.
- 6 (a) With a neat sketch explain the growth of boundary layer on a smooth flat plate?
- (b) A thin plate is moving in still atmospheric air at a velocity of 5m/s. The length of the plate is 0.6m and width 0.5m. Calculate (i) the thickness of the boundary layer at the end of the plate, and (ii) drag force on one side of the plate. Take density of air as 1.24kg/m³ and kinematic viscosity 0.15 stokes.



SECTION - IV

- 7 (a) Derive the equation for discharge through a large rectangular orifice.
(b) A rectangular orifice 0.9 m wide 1.2m deep is discharging water from a vessel. The top edge of the orifice is 0.6 m below the water surface in the vessel. Calculate the discharge through the orifice if $C_d=0.6$ and percentage error if the orifice is treated as a small orifice.
- 8 (a) Derive the equation for discharge through a V-Notch.
(b) Water flows over a rectangular weir 1m wide at a depth of 150mm and afterwards passes through a triangular right-angled weir. Taking C_d for the rectangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir.

SECTION - V

- 9 (a) Derive an expression for the force exerted by the jet of water on a stationary inclined plate.
(b) A jet of water moving at 12m/sec impinges on vane shaped to deflect the jet through 120° when stationary. If the vane is moving at 5m/sec. Find the angle of jet so that there is no shock at inlet. What is the absolute velocity of the jet at exit in magnitude and direction and the work done/sec per Unit weight of water/sec? Assume that the vane is smooth.
- 10 (a) Differentiate between:
i) The Impulse and Reaction turbines
ii) Tangential flow, Radial flow and Axial flow turbines.
(b) A Pelton wheel has to be designed for the following data: Power to be developed 6000kW, Net available head 300m, Speed 550rpm, Ratio of jet diameter to wheel diameter 1/10, Overall efficiency 85%, Find the number of jets, diameter of the jet, diameter of the wheel and the quantity of water required?

SECTION - VI

- 11 (a) Describe with a neat sketch the working of Governing of a turbine.
(b) A turbine develops 7000kw shaft power when running at 200rpm. The head on the turbine is 40m, if the head on the turbine is reduced to 25m. Determine the speed, power developed by the turbine and also determine type of turbine.
- 12 (a) Explain the working principle of a centrifugal pump with a neat sketch.
(b) A centrifugal pump delivers $0.3\text{m}^3/\text{s}$ against a head of 30m at 1400rpm. The external diameter of the impeller is 0.5m and the outlet width is 0.05m. If manometric efficiency is 80%, find the vane angle at the outlet.

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Code : 17CE2202

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester

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

Time: 3 hours

Max. Marks: 60

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

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SECTION - I

- 1 Design a simply supported rectangular beam for 4 m effective span which is subjected to a dead load of 12 kN/m and a live load of 15 kN/m. Use M25 mix and Fe500 grade steel.
- 2 Find the moment of resistance of a beam 250 mm x 400 mm deep if it reinforced with 4 – 16 mm bars in both compression and tension zone, each at an effective cover of 40 mm. Assume M20 mix and Fe415 grade steel.

SECTION - II

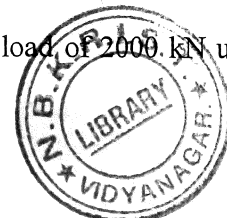
- 3 Determine the reinforcement required for a beam of size 300 mm x 600 mm subjected to a factored bending moment of 150 kN-m, factored shear force of 100 kN and factored torsional moment of 50 kN-m. Use M20 mix and Fe415 grade steel.
- 4 A RC beam of rectangular section 300 mm x 550 mm deep (overall) is reinforced with 5-20 mm diameter at a cover of 50 mm. Design shear reinforcement when the beam is subjected to a UDL of 80 kN/m on a simply supported span of 6 m. Use M20 mix and Fe415 grade steel for main reinforcement and Fe250 grade for shear reinforcement.

SECTION - III

- 5 Design a reinforced concrete slab for a hall measuring 8 m x 16 m. The slab is supported on RCC beams 250 mm wide and spaced at 4.0 m centre to centre. The superimposed load is 4 kN/m². Use M20 mix and Fe 415 grade steel.
- 6 Design a two way slab for a room 5.5 m x 4.0 m clear in size if the super imposed load is 4 kN/m². Use M25 mix and Fe 415 grade steel. Edges simply supported – corners not held down

SECTION - IV

- 7 Design the reinforcement for a circular column of diameter 400 mm subjected to an ultimate load of 1600 kN and an ultimate moment of 125 KN-m about the major axis. Use M20 concrete and Fe415 grade steel
 - a) Using Lateral Ties
 - b) Using Helical Reinforcement
- 8 Design a short column, square in sections, to carry an axial load of 2000 kN using Fe 500 grade steel and M25 mix.



SECTION - V

- 9 Design a square footing of uniform thickness for an axially loaded column of 400 mm x 400 mm size. The safe bearing capacity of soil is 200 kN/m^2 . Load on column is 1200 kN. Use M20 concrete and Fe 415 grade steel.
- 10 Design a rectangular isolated footing for following particulars:
R.C. column bearing a vertical load : 1000 kN,
Column size : 350 x 550 mm,
Safe bearing capacity of soil : 120 kN/m^2 ,
Use M20 concrete and Fe415 grade steel.

SECTION - VI

- 11 Design a dog legged stair case for a residential building hall measuring 2.2 m x 4.7 m. The width of the landing is 1m. The distance between floor to floor is 3.2 m. The rise and tread may be taken as 150 mm and 270 mm respectively. The weight of floor finish is 1.25 kN/m^2 . The materials used are M20 grade concrete and Fe415 grade steel.
- 12 A rectangular beam section 200 mm wide and 450 mm overall depth is reinforced with 3 bars of 16 mm diameter at an effective depth of 420 mm. Two hanger bars of 12 mm diameter are provided at the compression face. The effective span of the beam is 5 m. The beam supports a service load of 10 kN/m. If $f_{ck}=20\text{MPa}$ and $f_y= 415\text{MPa}$. Compute the short term deflection.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**SURVEYING - II**
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

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

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SECTION - I

- 1 (a) List out the advantages and disadvantages of theodolite survey
(b) Explain the procedure for measurement of angles by repetition method using theodolite.
- 2 A and B are two stations of a location traverse, their total co-ordinates in meter being:

	Total Latitude	Total Departure
A	34,321	7,509
B	33,670	9,652

A straight reach of railway is to run from C, roughly south of A to D invisible from C and roughly north of B, the offsets perpendicular to the railway being $AC = 130$ m and $BD = 72$ m. Calculate the bearing of CD.

SECTION - II

- 3 (a) Compare Fixed hair and movable hair method in tachometric survey.
(b) Derive the expression for the horizontal distance D when the staff is held vertical.
- 4 A tacheometer is set up at an intermediate point on a traverse course PQ and the following observations are made on a vertical held staff:

Staff station	Vertical angle	Staff intercept	Axial hair readings
P	$+ 8^{\circ} 36'$	2.350	2.105
Q	$+ 6^{\circ} 6'$	2.065	1.895

The instrument is fitted with an anallactic lens and the constant is 100. Compute the length of PQ and reduced level of Q, that of P being 321.50 meters.



SECTION - III

- 5 Explain various components of a simple circular curve with suitable diagram.
- 6 (a) List out the uses and characteristics of transition curve.
- (b) Describe the procedure for setting out of curve by using Rankine's one theodolite method.

SECTION - IV

- 7 (a) Explain the term scale of photograph and obtain an expression.
- (b) Two points A & B have elevations of 700m and 350m respectively, above the datum. These points are photographed with a camera of focal length 22.2 cm at a flying altitude of 3250m above datum Find the distance between AB. The photographic co-ordinates are as follows:

Point	Photo graphic coordinates	
	X(cm)	Y(cm)
A	+4.75	+3.85
B	-3.25	+7.68

- 8 (a) Explain about EMR with suitable diagram.
- (b) Describe the interaction of electromagnetic radiation with atmosphere.

SECTION - V

- 9 (a) List out the advantages and limitations of Total station.
- (b) Explain the temporary adjustments of a Total station.
- 10 (a) Explain the procedure to find the area by using Total Station.
- (b) Describe the basic features of a Total station.

SECTION - VI

- 11 (a) Explain the components of GPS.
- (b) Compare GPS with DGPS.
- 12 (a) Define the following terms: GIS; Spatial data; Attribute data; DBMS; and Map.
- (b) What is Map projection? Explain Cylindrical map projection and its types.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**SOIL MECHANICS
(Civil Engineering)**

Time: 3 hours

Max. Marks: 60

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

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SECTION - I

- 1 (a) Explain the determination of field density of soil by sand replacement method. What is the advantage of this method when compared to core cutter method?
- (b) A gray silty clay (CL) is sampled from a depth of 3.75 m. The moist soil was extruded from 152.4 mm high brass liner with an inside diameter of 71.9 mm and weighed 777 g. A small chunk of original sample had a weight of 140.9 g and weighed 85.2 g after drying. The specific gravity of soil solids is 2.61. Find the bulk density, dry density, void ratio, water content, degree of saturation of the soil. Also draw the three-phase diagram of the sample.
- 2 (a) Define void ratio, porosity, degree of saturation, water content, and specific gravity of soil solids for soil.
- (b) An airport runway fill needs $600,000 \text{ m}^3$ of soil in compacted state with a void ratio of 0.75 and water content of 10%. There are two borrow pits A and B from where the required soil can be taken and transported to the site. Neglecting water charges, select the suitable borrow pit for runway fill based on cost.

Borrow pit	Water content	In situ void ratio	Excavation and transportation cost
A	6%	0.80	Rs. 10/m ³
B	8%	1.70	Rs. 5/m ³

SECTION - II

- 3 (a) Define liquid limit, plastic limit and shrinkage limit. What is the use of consistency limits?
- (b) Based on grain size distribution analysis, the D₁₀, D₃₀, D₆₀ values of a given soil are 0.23 mm, 0.3 mm and 0.41 mm respectively. Classify the soil as per IS classification.
- 4 (a) Explain the IS soil classification system.
- (b) A 100% fine grained soil has 60% (by weight) silt content and natural water content of 33%. The soil behaves as semi-solid when water content is between 15% and 28%. The soil behaves fluid-like when water content is more than 40%. Find the activity of soil, plasticity index, consistency index and liquidity index?

SECTION - III

- 5 (a) Write the characteristics and uses of flow net.



- (b) A non-homogeneous soil deposit consists of a silt layer sandwiched between a fine sand layer at top and a clay layer below. Permeability of the silt layer is 10 times the permeability of the clay layer and one-tenth of the permeability of the sand layer. Thickness of the silt layer is 2 times the thickness of the sand layer and two-third of the thickness of the clay layer. Find the ratio of equivalent horizontal and equivalent vertical permeability of the deposit?
- 6 (a) State Darcy's law. Derive the expression for coefficient of permeability of fine grained soil by the falling head method.
- (b) A sand deposit of 12 m thick lies over a clay layer. The water table is 3 m below the ground surface. In the field permeability pump-out test, the water is pumped at the rate of 540 lpm when steady state conditions are reached. Two observation wells are located at 18 m and 36 m from the center of the test well. The depths of the drawdown curve are 1.8 m and 1.5 m respectively for these two wells. Determine the coefficient of permeability of sand.

SECTION - IV

- 7 (a) List the various factors that influence the compaction of soils. Explain with neat sketches their influence on compaction of soils.
- (b) For the soil strata shown in Fig. 7b., the water table is lowered by drainage by 2 m and if the top 2 m thick silty sand stratum remains saturated by capillary action even after lowering the water table. Draw the total stress, neutral stress and effective stress diagrams before and after lowering the water table. Also find the increase in effective stress at mid height of clay layer.

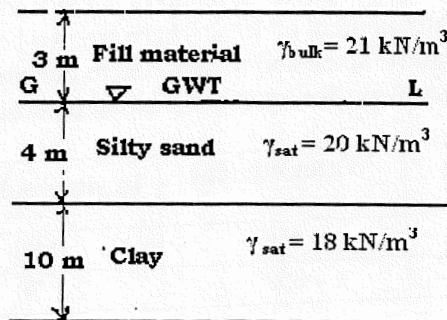


Fig 7b

- 8 (a) Define total stress, effective stress and neutral stress in soils. Explain the determination of the same for a stratified soil with water table condition.
- (b) You are an earthwork construction control inspector checking the field compaction of a layer of soil. Laboratory compaction test on the soil gives OMC=16% and MDD =17.4 kN/m³. Specification call for the compacted density to be at least 95% of maximum laboratory value and with in $\pm 2\%$ of the optimum water content. When you did the sand cone test, volume of soil excavated was 1165 cm³. It weighed 2230 g wet and 1852 g dry. What is the compacted dry density? What is the field water content? What is the relative compaction? Does the test meet specifications? What is the degree of saturation of the field sample? If the sample were saturated at constant density, what would be the water content?

SECTION - V

- 9 (a) Define the 'pre-consolidation pressure' Describe the procedure for determining the pre-consolidation pressure. Why you want to know the preconsolidation pressure of soil?

- (b) A layer of saturated clay is 4m thick and is overlaid by 1m thick sand layer. The clay has Specific gravity = 2.7, Water content = 33% and compression index = 0.40. The average overburden pressure in clay layer is 55 kN/m^2 . If the proposed building on the clay deposit is going to increase the vertical pressure in clay by 20 kN/m^2 , estimate the probable final settlement of the building.
- 10 (a) Explain the 'square root of time fitting' method for determination of coefficient of consolidation.
- (b) Two clay layers A and B 5.6 m thick in the field, the time taken by layer A to reach 50% consolidation is 4 months, Calculate the time required for layer B to reach the same degree of consolidation if layer A has double drainage and layer B has single drainage. The coefficient of consolidation of layer B is twice that of layer A.

SECTION - VI

- 11 (a) Explain with neat sketch the direct shear test and determination of shear strength parameters from the test.
- (b) A soil specimen when tested in unconfined compression test fails at axial stress of 120 kN/m^2 , the same sample tested in tri-axial compression test the failure occurs at cell pressure of 40 kN/m^2 and axial deviator stress of 160 kN/m^2 . Determine shear strength parameter.
- 12 (a) What are the three standard triaxial shear tests with respect to drainage conditions? Explain with reasons the situations for which each test is to be preferred.
- (b) A vane 20 cm long and 10 cm in diameter was pressed into a soft marine clay at the bottom of a bore hole. Torque was applied gradually and failure occurred at 10 kN-cm. Find the cohesion of the clay in kN/cm^2 .



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

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

Time: 3 hours

Max. Marks: 60

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

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SECTION - I

- 1 (a) Explain the importance of transportation for development of country.
- (b) What are obligatory points? Discuss how these control the alignment with sketches.
- 2 Explain how the master plan is prepared and the road development program is phased?

SECTION - II

- 3 (a) What is superelevation? Derive an expression for superelevation.
- (b) The speeds of overtaking and overtaken vehicles are 60 kmph and 54 kmph. If the acceleration of overtaking vehicle is 2.5 kmph per second, calculate the Overtaking Sight Distance. Draw a neat sketch and show the features of OSD.
- 4 A state highway passing through a rolling terrain with design speed of 65 kmph. has a horizontal curve of 60m radius. Design all the geometric features of the horizontal curve assuming suitable data. Take centrifugal acceleration as 0.6m/sec^3 . The pavement is rotated about inner edge.

SECTION - III

- 5 (a) Explain the factors affecting design of pavements in brief.
- (b) Summarise Group Index method of Flexible pavement design and calculate the G.I value for a subgrade soil having liquid limit as 50 % , Plastic limit = 41 % and percentage fines passing through 0.075 mm sieve is 55%.
- 6 Describe the flexible pavement design by CBR method in detail.

SECTION - IV

- 7 (a) Draw a neat sketch of Rigid pavements. Explain the functions each component.
- (b) Discuss the critical load locations in rigid pavements.
- 8 Calculate the wheel load stresses at interior, edge and corner regions of a concrete pavement using Westergaard's stress equation for the following data:
Wheel load=5100 kg,
Modulus of elasticity of concrete= $3.0 \times 10^5 \text{ kg/cm}^2$
Pavement thickness=18cm
Modulus of subgrade reaction= 6.0 kg/cm^3
Radius of loaded area =15cm
Poisson's ratio of concrete= 0.15



SECTION - V

- 9 (a) Explain the maintenance of pot holes in bituminous pavements.
(b) With sketches explain the effective surface drainage system for roads.
- 10 (a) Explain how mud pumping leads to failure of CC pavement slabs.
(b) Discuss the road construction in waterlogged areas.

SECTION - VI

- 11 Describe and explain with sketches, the various types of traffic signs.
- 12 (a) The average normal flow of traffic on two cross roads A and B are during design periods are 400 and 250 PCU /hr. The saturation flow values on these roads are estimated as 1250 and 1000 PCU/hr respectively. The all red time for pedestrian carrying is 12 seconds. Design the two phase traffic signal approach by Webster method and draw the phase diagram.
(b) Explain the concept of level of service with the help of a neat sketch.

II B.Tech II Semester**SURVEYING - 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 Explain the methods of measuring vertical angles with a theodolite. Discuss the advantages of each type.
2. List out the permanent adjustments to be carried out on a transit theodolite and explain each of them briefly.

SECTION - II

- 3 A tacheometer was set up at station P and observations were made to a staff held normal to the line of sight over point Q. The vertical angle measured was $6^{\circ}36'$. The three hair readings were 1.905, 2.480, and 3.055. The reading from P, with the line of sight horizontal to a BM of RL 852.55 was 1.855. If the instrument constants are 100 and 0.5, find the RL of Q.
- 4 Explain the principle of stadia method. Write the advantages and disadvantages of subtense method over stadia method.

SECTION - III

- 5 A circular curve has a 200 m radius and 650 deflection angle. Find (i) Degree of the curve (ii) Length of the curve (iii) Tangent length (iv) Length of long chord (v) Apex distance and (vi) Mid-ordinate
- 6 (a) What are the elements of a simple circular curve? What are unit chord and sub chord?
(b) How you will set out the horizontal circular curve by two theodolite method?

SECTION - IV

- 7 What is total station, what are various functions of total station? Explain in detail.
- 8 Enumerate the instrumental errors in GPS.

SECTION - V

- 9 Explain briefly Types of Photographs.
- 10 Explain with neat sketch Vertical Aerial Photographs. Derive it.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester
STRUCTURAL ANALYSIS - I
 (Civil Engineering)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 A simply supported beam of span 8 metres is loaded with three concentrated loads of 30 kN, 50 kN and 75 kN at distances of 2m, 4m and 6m, respectively from the left end. Find the position and magnitude of maximum deflection.
- 2 (a) Determine, by the method of double integration, the deflection curve of the simply supported beam of span 'L' loaded by the couple 'M' at a distance 'a' from one end.
- (b) Derive the equation for the deflection at the free end of a cantilever beam with concentrated load 'W' at the free end.

SECTION - II

- 3 Derive an expression for the Euler's crippling load in a column when one end fixed and the other end hinged. Write the assumptions made in the derivation.
- 4 (a) Distinguish between Euler's theory and Rankine's theory.
- (b) Compare the crippling loads given by Euler's and Rankine's formulae for a tubular steel strut 3 m long having outer and inner diameters of 4 cm and 3.5 cm, respectively. Assume pin joints at both ends, f_c is 320 MPa, $\alpha = (1/5007)$, $E = 210$ GPa.

SECTION - III

- 5 A short hollow cylindrical column carries a compressive force of 400 kN. The external diameter of the column is 200 mm and the internal diameter is 120 mm. Find the maximum permissible eccentricity of the load, if the allowable stresses are 60 MPa in compression and 25 MPa in tension.
- 6 A beam of rectangular section of size 100 mm x 150 mm carries a uniformly distributed load of 50 kN/m over a span of 3 m and an axial compressive force of 30 kN. Calculate (i) maximum fibre stress, (ii) fibre stress at a point 0.75 m from the left end of the beam and 50 mm below the neutral axis.

SECTION - IV

- 7 (a) Find the support moment for a propped cantilever of span 'L' subjected to moment 'M' at the prop. Draw bending moment diagram.
- (b) Determine the reaction at the support for a propped cantilever beam of span 6m, with an uniformly distributed load of 10 kN/m throughout the span.



- 8 A fixed beam of length 6m carries point loads of 30 kN and 20 kN at distances 2m and 4m from the left end 'A'. Find the fixed end moments and the reactions at the supports. Draw bending moment and shear force diagrams.

SECTION - V

- 9 A continuous beam ABC of uniform section of uniform section, with span AB and BC as 4m each, is fixed at A and simply supported at B and C. The beam is carrying a uniformly distributed load of 8 kN/m throughout its length. Find the support moments and the reactions. Also, draw the bending moment and shear force diagrams.
- 10 A continuous beam ABCD of length 20m rests on four supports covering 3 equal spans and carries a uniformly distributed load of 4 kN/m length. Calculate the moments and reactions at the supports. Draw the shear force and bending diagrams also.

SECTION - VI

- 11 Calculate the deflection and slope at the free end of a cantilever beam carrying uniformly distributed load of 20 kN/m over the entire span and a concentrated load of 50 kN at the free end using Castigliano's First Theorem.
- 12 Analyse the continuous beam shown in the fig. 1 by using Force method and draw the shear force and bending moment diagrams.

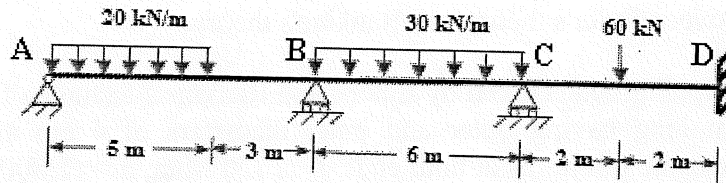


Fig. 1

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester**BUILDING PLANNING AND DRAWING**
(Civil Engineering)

Time : 3 hours

Max Marks: 60

*Note: Two full questions from Part A and Question 4 from Part B.**Assume suitable data wherever necessary**Drawing sheets should be folded to the size of answer book and fasten it severely to main answer book***PART - A**

- 1 (a) Explain the different factors affecting the site selection for a residential building.
(b) Describe the important departments and facilities to be provided in the layout of general hospital.
2. (a) How the planning of a public building does differs from planning of a residential building? Explain the key factors to be considered in the design of an educational institution.
(b) Write the importance and necessity in planning of banks.
- 3 (a) Write a short notes on the following :
i) Detached house ii) Setback iii) Floor area ratio iv) Building line
(b) Write the list of documents to be submitted for building plan approval?

PART - B

- 4 (a) Draw the Conventional signs and symbols for the following
i) Iron and Steel ii) Gravel iii) Earth iv) Brick Masonry v) Stone Masonry
(b) The line diagram of residential building shown in fig. 1.
Draw the plan of the building providing doors, windows and ventilators of standard sizes at suitable locations. Assume any data required.

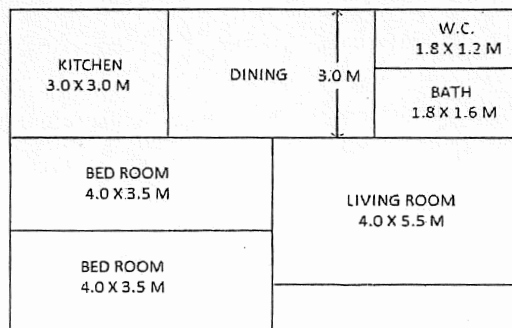


Figure 1



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1. The first part of the report is a general introduction to the project. It describes the objectives of the study and the methods used to collect and analyze the data. The introduction also provides a brief overview of the results and conclusions of the study.

2. The second part of the report is a detailed description of the data collection and analysis process. This section includes a description of the data sources, the methods used to collect the data, and the statistical methods used to analyze the data.

3. The third part of the report is a discussion of the results of the study. This section includes a description of the findings and a discussion of their implications for the field of research.

4. The fourth part of the report is a conclusion and a list of references. The conclusion summarizes the main findings of the study and provides a final statement on the significance of the results. The references list the sources of information used in the study.

5. The fifth part of the report is an appendix containing additional information related to the study. This section includes a list of the data sources, a description of the data collection process, and a list of the statistical methods used.

6. The sixth part of the report is a list of figures and tables. This section includes a description of each figure and table and a reference to the text in which it is used.

7. The seventh part of the report is a list of abbreviations and acronyms. This section includes a description of each abbreviation and acronym and a reference to the text in which it is used.

8. The eighth part of the report is a list of symbols and units. This section includes a description of each symbol and unit and a reference to the text in which it is used.

9. The ninth part of the report is a list of footnotes. This section includes a description of each footnote and a reference to the text in which it is used.

10. The tenth part of the report is a list of appendices. This section includes a description of each appendix and a reference to the text in which it is used.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023**II B.Tech II Semester****TRANSPORTATION ENGINEERING - 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) What is the necessity of Transportation? Explain briefly about different modes of Transportation.
- (b) Explain different classifications of roads in detail.
2. (a) Explain the various characteristics of road transport .
- (b) Justify why master plan and its phasing is essential in highway engineering .

SECTION - II

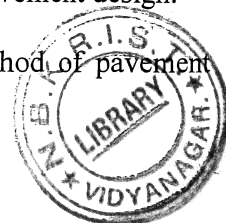
- 3 (a) Write the fundamental expression for the calculating the super elevation in India for plain and rolling areas.
- (b) Explain super elevation and discuss briefly maximum and minimum super elevation.
- 4 (a) Design the rate of super elevation for a horizontal highway curve of radius 400 m and speed 80 kmph.
- (b) The design speed of a highway is 100 kmph. There is a horizontal curves of radius 200 m on a certain locality. Safe limit of transverse coefficient of friction is 0.15.

SECTION - III

- 5 (a) Enlist different properties of bitumen and discuss briefly any three .
- (b) Define bitumen and write a short note on flash and fire point test with a neat sketch.
- 6 (a) What the different types of aggregates mixes and explain any two?
- (b) Justify how flakiness index and elongation index is considered in road construction.

SECTION - IV

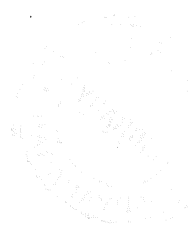
- 7 (a) Discuss the advantages and limitations of C.B.R. Method of pavement design.
- (b) Discuss the advantages and limitations of Group index method of pavement design.



- 8 Enlist types of joints and joint filler materials in rigid pavements and explain each type with a neat diagram.

SECTION - V

- 9 Discuss the importance of surface and subsurface drainage methods in roads construction,
- 10 Discuss briefly construction procedure of cement concrete pavement with neat sketch,



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester**SOIL MECHANICS**

(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) Derive relationship between e, w, G and s .
- (b) A moist soil sample weighs 3.52N After oven drying in an oven, its weight is reduced to 2.9N. the specific gravity of solids is 2.65 and mass specific gravity is 1.85. Determine water content, void ratio, porosity and degree of saturation.
2. Explain in detail about the sand replacement method of determining the field density indicating all the observations and calculations.

SECTION - II

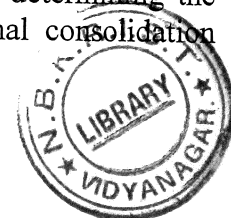
- 3 (a) Explain the factors that affect permeability of soils in the field.
- (b) Calculate the coefficient of permeability of a soil sample, 6cm in height and 50cm² in cross sectional area, if a quantity of water equal to 430ml passed down in 10 min, under an effective constant head of 40cm.
- 4 Define (i) total stress (ii) effective stress (iii) phreatic line (iv) seepage pressure.

SECTION - III

- 5 Distinguish between Standard and modified Proctor compaction tests.
- 6 (a) Write the assumptions in Boussinesq's theory of stress distribution.
- (b) Discuss the basis of the construction of Newmark's influence chart and how is it used.

SECTION - IV

- 7 (a) Distinguish between normally consolidated and over consolidated soils.
- (b) Define primary consolidation settlement, secondary consolidation settlement Degree of consolidation.
- 8 Define Pre-consolidation pressure. Describe the procedure for determining the Pre-consolidation pressure from the results of one dimensional consolidation test.



SECTION - V

- 9 Derive a relationship between the principal stresses at failure using Mohr coulomb failure criteria.
- 10 Describe unconfined compression test. Discuss the merits and demerits of unconfined compression test.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ENGINEERING ECONOMICS & FINANCIAL ACCOUNTING**

(Common to EEE & ECE)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION – I

- 1 (a) Define Micro Economics. Explain its nature.
- (b) Discuss the concept of Consumer equilibrium.
- 2 (a) Summarize the concepts of relatively elastic and relatively inelastic demand in detail.
- (b) Outline the factors determining demand and state demand function.

SECTION – II

- 3 (a) Explain production function. State the input-output relationship of production function.
- (b) Examine the cost concept and mention the various types of cost concepts.
- 4 (a) State the limitations of Break-Even Analysis.
- (b) Write the Law of Returns with appropriate examples.

SECTION – III

- 5 (a) Examine the features of perfect market under perfect competition.
- (b) What is monopoly? Explain the features of monopoly.
- 6 (a) Define price discrimination. Mention the factors that determine the degree of price discrimination.
- (b) Mention various factors that are responsible for monopolistic competition.

SECTION – IV

- 7 (a) Summarize the characteristics, merits and demerits of Sole trader.
- (b) Explain the features of Joint Stock Company. What are its advantages and disadvantages?
- 8 (a) Discuss the functions of commercial banks.
- (b) List out the characteristics, merits and demerits of Partnership.

SECTION – V

- 9 (a) Define Financial Accounting. Explain the importance and Limitations of Financial Accounting.
- (b) What is meant by double-entry book keeping? Mention the advantages of double entry book keeping.



- 10 Construct Journal Entries in the Books of Mr. Gopi for the year 2022.
- | | | |
|-----------------|----------------------------------|--------------|
| 2022, January 1 | Commenced business with cash | Rs. 1,00,000 |
| 2 | Cash Paid into bank | Rs. 70,000 |
| 3 | Purchased Furniture for Cash | Rs. 1,50,000 |
| 4 | Sold goods to Ram | Rs. 50,000 |
| 8 | Commission Received | Rs. 10,000 |
| 12 | Cash drawn bank for personal use | Rs. 10,000 |
| 25 | salaries Paid | Rs. 5,000 |
| 30 | Paid Rent | Rs. 10,000 |

SECTION – VI

- 11 (a) What is accounting rate of return (ARR)? State its advantages and disadvantages.
(b) Define capital budgeting. Explain its process.
- 12 The cost of a project is Rs.50,000 and annual cash inflows for the next five years are given as follows:
1st year Rs.25,000 2nd year Rs.25,000 3rd year Rs.25,000
4th year Rs.25,000 5th year Rs.25,000
What is the pay-back period for the project?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**TECHNICAL ENGLISH & SOFT SKILLS**
(Common to EEE, ECE & CSE)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION – I

- 1 Discuss the importance of technical presentation and how it can be portrayed in the best way possible?
- 2 Write the dos and don'ts of communicating technical topics.

SECTION – II

- 3 Mention the key points to be considered during a group discussion.
- 4 Discuss the dos and don'ts of body language to be maintained during the group discussion.

SECTION – III

- 5 Explain the importance of cover letter and the pattern to be considered while making it.
- 6 Create your resume for applying for the post of a fresher at a company

SECTION – IV

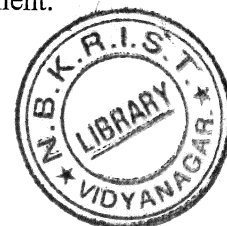
- 7 Give a brief explanation on Haptics , Proxemics , kinesics , Chronemics, Oculesics and Vocalics.
- 8 What are the dos and don'ts of non-verbal communication in the process of communication?

SECTION – V

- 9 Discuss the types in personality development skills. Give a short note on each of them.
- 10 What are the techniques required to develop problem solving skills? How can positive attitude improve our working environment?

SECTION – VI

- 11 Explain the importance of career planning and time management.
- 12 Discuss in detail about the importance of goal setting.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester

PULSE & SWITCHING CIRCUITS

(Common for EEE & ECE)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 (a) Design the high pass and low pass RC circuit by assuming square wave as input.
(b) Explain about clippers and its types.
- 2 (a) Explain how low pass acts as integrator and high pass acts as differentiator.
(b) A symmetrical square wave of $\pm 5V$ at a frequency of 5kHz is applied to a high pass RC circuit with a cut off frequency of 20 kHz. Sketch the steady state input & output voltage waveforms. Calculate the steady state output voltage level.

SECTION - II

- 3 (a) Describe the Switching characteristics of transistors.
(b) Explain the working of NMOS inverter circuit With Neat Sketch.
- 4 (a) Explain the Two-input MOS NAND gate.
(b) Briefly explain the CMOS NAR gate stick diagram layout.

SECTION - III

- 5 (a) Explain the triggering of astable multivibrator and derive an expression for frequency of oscillation.
(b) List the applications of astable multivibrator
- 6 (a) List the applications of Schmitt trigger.
(b) Define upper trigger point and lower trigger point in a Schmitt trigger circuit.

SECTION - IV

- 7 (a) Briefly explain the different Types of Sweep Generators.
(b) Explain the Current Time Base Generator and Waveform Generator.



- 8 (a) Explain the working of a UJT relaxation oscillator circuit.
- (b) Explain the Operation of a Unidirectional Diode Sampling Gates.

SECTION - V

- 9 (a) Write the Important Features of Power Amplifiers.
- (b) Explain the working of Class A Power Amplifier and write the advantages and disadvantages.
- 10 (a) Explain the operation of Class B Complementary Symmetry Amplifier.
- (b) Write the Comparison of Push Pull & Complementary Symmetry circuits.

SECTION - VI

- 11 (a) Explain the Need for tuned circuits.
- (b) Explain in detail about single tuned amplifier.
- 12 (a) Explain the operation of stagger tuned amplifier.
- (b) Write the Applications of tuned amplifier.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ENGINEERING MATHEMATICS - IV**
(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 Find a root of the equation $x^3 - 4x - 9 = 0$ using bisection method correct to three decimal places.
- 2 By the method of least squares, find the straight line that best fits the following data:

x	1	2	3	4	5
y	14	27	40	55	68

SECTION - II

- 3 Apply Gauss elimination method to solve the equations
 $x+4y-z = -5$; $x+y-6z = -12$; $3x-y-z = 4$
- 4 Apply Gauss-Seidel iteration method to solve the equations
 $20x+y-2z = 17$; $3x+20y-z = -18$; $2x-3y+20z = 25$.

SECTION - III

- 5 Solve $y' = x + y$, given $y(1) = 0$. Find $y(1.1)$ and $y(1.2)$ by using Taylor's method. Compare the result with its exact value.
- 6 Using Runge-Kutta fourth order method, find $y(0.1)$ and $y(0.2)$ given that
 $\frac{dy}{dx} = x + y$, $y(0) = 1$

SECTION - IV

- 7 Estimate the value of $f(22)$ and $f(42)$ from the following data:

x	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

- 8 For the following data, find $\frac{dy}{dx}$ at (i) $x=1.2$ and (ii) $x=1.6$

x	1.0	1.2	1.4	1.6	1.8	2.0	2.2
y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

SECTION - V

- 9 A random variable X has the following probability function:

X	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

- (i) Determine K (ii) Evaluate $P(X < 6)$ and $P(0 < X < 5)$ (iii) Mean and (iv) Variance
10 If the variance of Poisson variate is 3, then find the probability that
(i) $x=0$ (ii) $0 < x \leq 3$ and (iii) $1 \leq x < 4$



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**SWITCHING THEORY & LOGIC DESIGN**
(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 Convert the following numbers:
 i) $(4567)_8 = (?)_{10}$ ii) $(11001101.0101)_2 = (?)_8$ iii) $(53.1575)_{10} = (?)_2$
 iv) $(EEE.ECE)_{16} = (?)_2$
- 2 A 7-bit Hamming code received is 0111011. What is correct code?

SECTION - II

- 3 Simplify the following Boolean function for minimal SOP form using K-map
 $F(W, X, Y, Z) = \sum m(0, 1, 2, 3, 4, 6, 8, 9, 10, 11)$
- 4 (a) Reduce the following Boolean function with K-Map $f = \sum m(0, 1, 2, 3, 5, 7, 8, 9, 10, 12, 13)$
 (b) Expand $A + BC + AB + ABCD$ into minterms.

SECTION - III

- 5 Construct a 4 line to 16 line Decoder using 3 line to 8 line decoder. Draw the logic diagram with necessary connections.
- 6 (a) Design a 1:8 demultiplexer using two 1:4 demultiplexer.
 (b) Perform the realization of full adder using decoders and logic gates.

SECTION - IV

Draw the logic symbols and truth tables of JK and T flip flop.
 Explain the working of a master-slave JK flip flop and state its advantages.

Compare Asynchronous & synchronous counter.
 Design a synchronous counter for a given sequence 0,3,5,6.

SECTION - V

Design a combinational circuit using PROM, the circuit accepts a 3-bit binary input and generates its equivalent XS-3 code.

Compare ROM, EPROM, EEPROM.



7 (a)
(b)

8 (a) Con.
(b) Desig.

9 Design a c
number and g

10 Write short note o.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ELECTROMAGNETIC FIELDS**
(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 (a) Convert points P(-3,2,1) to Cylindrical and Spherical coordinates.
(b) Transform the vector $\mathbf{B} = y\mathbf{a}_x - x\mathbf{a}_y + z\mathbf{a}_z$ into cylindrical coordinates.
- 2 (a) State Coulomb's law of force between any two point charges and state the units of force.
(b) Four point charges each of $10\mu\text{C}$ are paced in a free space at the points (1,0,0), (-1,0,0), (0,1,0) and (0,-1,0)m respectively. Determine the force on a point charges of 30μ located at a point (0,0,1)m.

SECTION - II

- 3 (a) State and prove the Gauss's law.
(b) A Spherical volume charge density is given by,

$$\rho_v = \rho_0 \left(1 - \frac{r^2}{a^2} \right), r \leq a$$

$$= 0, r > a$$
 - i) calculate the total charge Q
 - ii) find \bar{E} outside the charge distribution
 find \bar{E} for $r < a$.

- 4 (a) Obtain an expression for the energy stored in electrostatic fields. State its units.
(b) Given the potential field, $V = 2x^2y - 5Z$, calculate V, E, D and volume charge density at a point P(-4,3,6).

SECTION - III

- 5 (a) Explain boundary conditions for dielectric-dielectric interfaces.
(b) Find the total current in a circular conductor of radius 4mm if the current density varies according to $J = \frac{10^4}{r} \text{ A/m}^2$
- 6 (a) Explain Dipole Moment & Polarization.
(b) Derive continuity equation.



SECTION - IV

- 7 (a) State and Explain Biot- Savart law.
(b) Find Magnetic Field Intensity due to the infinite long straight conductor using Biot-Savart law.
- 8 (a) State and explain Ampere's circuital law.
(b) An infinitely long conducting filament is placed along the x-axis and carries current 10 mA in the a_x direction. Find H at (-2, 3, 4).

SECTION - V

- 9 (a) Explain boundary conditions for dielectric-conductor interfaces in magnetic fields
(b) Two differential $I_1\Delta L_1=4\times 10^{-6} a_x$ A.m at $P_1(1,0,2)$ and $I_2\Delta L_2=3\times 10^{-6} (-0.5 a_x+0.4 a_y+0.9a_z)$ A.m at $P_2(2, -2, -3)$ are located in free space. Find the vector force exerted on (i) $I_1\Delta L_1$ by $I_2\Delta L_2$ (ii) $I_2\Delta L_2$ by $I_1\Delta L_1$
- 10 (a) A solenoid of 10 cm in length consists of 1000 turns having the cross-sectional radius of 1cm.find the inductance of the solenoid. What is the value of the current required to maintain a flux of 1mWb in the solenoid? Take $\mu_r = 1500$
(b) Derive an expression for Magnetic Torque and Magnetic Dipole moment.

SECTION - VI

- 11 (a) Explain of Faraday's law for time-varying fields.
(b) Derive an equation for modified Ampere's Circuital law.
- 12 (a) Obtain integral form of Maxwell's equations from Amperes' circuital law in the generalized form.
(b) Find a lossy dielectric, $\sigma = 5$ S/m and $\epsilon_r = 1$. The electric field intensity is $E = 100 \sin 10^{10} t$. Find J_C , J_D and frequency at which both have equal magnitudes.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**POWER SYSTEMS - I**

(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 (a) How A.C. distribution calculations differ from those of D.C. distribution.
(b) A 2-wire d.c. distributor AB is 300 metres long. It is fed at point A. The various loads and their positions are given below :

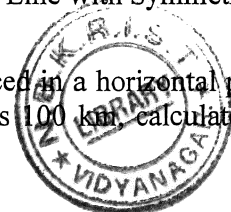
At point	distance from A in metres	concentrated load in amperes
C	40	30
D	100	40
E	150	100
F	250	50

If the maximum permissible voltage drop is not to exceed 10 V, find the cross-sectional area of the distributor. Take $\rho = 1.78 \times 10^{-8} \Omega\text{m}$.

- 2 (a) A 3-phase ring main ABCD fed at A at 11 kV supplies balanced loads of 50 A at 0.8 p.f. lagging at B, 120 A at unity p.f. at C and 70 A at 0.866 lagging at D, the load currents being referred to the supply voltage at A. The impedances of the various sections are :
Section AB = $(1 + j 0.6) \Omega$; Section BC = $(1.2 + j 0.9) \Omega$
Section CD = $(0.8 + j 0.5) \Omega$; Section DA = $(3 + j 2)$
Calculate the currents in various sections and station bus-bar voltages at B, C and D.
(b) A single phase a.c. distributor AB 300 metres long is fed from end A and is loaded as under :
(i) 100 A at 0.707 p.f. lagging 200 m from point A
(ii) 200 A at 0.8 p.f. lagging 300 m from point A
The load resistance and reactance of the distributor is 0.2Ω and 0.1Ω per kilometre. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end.

SECTION - II

- 3 (a) Derive the expression for Inductance of a 3-Phase Overhead Line with Symmetrical spacing.
(b) A single phase transmission line has two parallel conductors 3 m apart, the radius of each conductor being 1 cm. Calculate the loop inductance per km length of the line if the material of the conductor is (i) copper (ii) steel with relative permeability of 100.
- 4 (a) Derive the expression for Capacitance of a 3-Phase Overhead Line with Symmetrical spacing.
(b) A 3-phase, 50 Hz, 132 kV overhead line has conductors placed in a horizontal plane 4 m apart. Conductor diameter is 2 cm. If the line length is 100 km calculate the charging current per phase assuming complete transposition.



SECTION - III

- 5 (a) Explain the different factors effecting corona and mention its advantages and disadvantages.
- (b) How to Reduce the Ferranti Effect in AC Transmission Lines.
- 6 (a) What is meant by proximity effect? Discuss with neat sketch.
- (b) What Is Skin Effect? What are the cause of Skin Effect

SECTION - IV

- 7 (a) Derive mathematical expression for string efficiency in insulator.
- (b) Each line of a 3-phase system is suspended by a string of 3 identical insulators of self-capacitance C farad. The shunt capacitance of connecting metal work of each insulator is $0.2 C$ to earth and $0.1 C$ to line. Calculate the string efficiency of the system if a guard ring increases the capacitance to the line of metal work of the lowest insulator to $0.3 C$.
- 8 (a) What are the requirements of insulators and give the advantages of suspension type insulators.
- (b) An overhead transmission line at a river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1 kg/m.

SECTION - V

- 9 (a) Give the expression of sag when supports are at unequal levels.
- (b) A transmission line has a span of 150 m between level supports. The conductor has a cross-sectional area of 2 cm^2 . The tension in the conductor is 2000 kg. If the specific gravity of the conductor material is 9.9 gm/cm^3 and wind pressure is 1.5 kg/m length, calculate the sag. What is the vertical sag?
- 10 (a) An overhead transmission line at a river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg, find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1 kg/m.
- (b) An overhead transmission line conductor having a parabolic configuration weighs 1.925 kg per metre of length. The area of X-section of the conductor is 2.2 cm^2 and the ultimate strength is 8000 kg/cm^2 . The supports are 600 m apart having 15 m difference of levels. Calculate the sag from the taller of the two supports which must be allowed so that the factor of safety shall be 5. Assume that ice load is 1 kg per metre run and there is no wind pressure

SECTION - VI

- 11 (a) What is the most general criterion for the classification of cables ? Draw the sketch of a single-core low tension cable and label the various parts.
- (b) Draw a neat sketch of the cross-section of the following :
- (i) 3-core belted cable (ii) H-type cable (iii) S.L. type cable
- 12 (a) Describe briefly some commonly used insulating materials for cables.
- (b) What should be the desirable characteristics of insulating materials used in cables ?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ELECTROMECHANICAL ENERGY CONVERSION - II**
(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 (a) Draw the phasor diagram of practical transformer on no load and on load with unity power factor and leading power factor.
- (b) Discuss about interleaved and sandwich winding configuration used in 1-phase transformer and its uses.
- 2 (a) Illustrate with working principle of auto transformer.
- (b) Derive the expression for saving of conductor with auto transformer.

SECTION - II

- 3 Explain the procedure for finding the magnitude of Hysteresis and Eddy current losses in a 1-phase transformers with neat circuit diagram, procedure and formulas.
- 4 (a) What are the condition to be satisfy for parallel operation of transformers and list out the merits with the parallel operation.
- (b) Derive the expression for current shared by two transformers feeding common load and operating with the different induced e.m.f's.

SECTION - III

- 5 With all possible connection discuss Star-Delta connections of 3-phase transformer along with the winding, phasor and clock diagrams.
- 6 (a) Construct and explain circuit diagram of open delta connection.
- (b) Why polarity test is conducted? Discuss the procedure for conducting the polarity test.

SECTION - IV

- 7 (a) Illustrate how the direction of Rotating Magnetic Field is reversed in 3-phase induction motor.
- (b) A 3-phase, 50 Hz, 1500 r.p.m induction motor has a full load speed of 1400 r.p.m. Calculate the following
 - i. Number of poles
 - ii. Full load slip and rotor frequency
 - iii. Speed of stator field with respect to stator structure and rotor structure.
 - iv. Speed of rotor field with respect to rotor structure and stator field.
- 8 (a) Derive the expression for Starting and Maximum torque.
- (b) Outline the power stages in Induction motor.



SECTION - V

- 9 (a) Why No load - Blocked rotor tests and Brake test are conducted on 3-phase induction motor. Compare both the experiments and justify the answers.
- (b) A 3-phase squirrel cage induction motor, with an applied voltage of 40% gives the blocked rotor current of 250% and internal starting torque of 30% of their corresponding rated values. If an auto transformer is limits the starting current to 150% of the motor full load torque, compute the percentage starting torque.
- 10 Explain the procedure for constructing circle diagram.

SECTION - VI

- 11 (a) Discuss the speed control of induction motor by injection of EMF into rotor circuit.
- (b) Two 50 Hz, 3-phase induction motor having 6 and 4 poles are connected in cumulative cascade, with 6-pole machine is excited with the mains supply. Determine the frequency of rotor current and slip referred to each stator field if the set frequency is 2%.
- 12 Discuss the construction, working, Equivalent circuit and applications of Double cage induction motor.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester**MACHINE TOOLS**
(Mechanical Engineering)

Time : 3 hours

Max Marks: 60

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

* * *

SECTION - I

- 1 List the different types of lathes available giving salient features of each.
- 2 (a) Briefly explain the different types of tool holding devices used in lathe machine.
(b) With a help of neat sketch, explain the turret indexing mechanism.

SECTION - II

- 3 Sketch a planing machine indicating major parts. Name any one of the mechanism for quick return movement in a planer.
- 4 (a) Explain various drilling machine operations with a sketch.
(b) With the help of a suitable sketch, describe the geometry of a twist drill and also explain.

SECTION - III

- 5 (a) Explain the working of universal milling machine.
(b) Differentiate between face milling and end milling.
- 6 Differentiate between:
Up milling and Down milling
Simple indexing and Compound indexing.

SECTION - IV

- 7 (a) Explain the factors to be considered for selection of grinding wheels.
(b) Differentiate between horizontal and vertical grinding machines.
- 8 (a) With a neat sketch, explain the lapping process. State its advantages and disadvantages.
(b) What is honing? Explain vertical honing process.

SECTION - V

- 9 Explain the Electro chemical machining process with sketch and mention its applications.
- 10 Explain the process of USM with a neat sketch and mention its advantages and disadvantages.

SECTION - VI

- 11 (a) Write the basic elements of an automated system and their types.
(b) Write about levels of automation.
- 12 (a) Explain working of single spindle automatic lathe.
(b) Explain working of multi spindle automatic lathe.



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Code : 17ME2204

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester

APPLIED THERMODYNAMICS - I
(Mechanical Engineering)

Time : 3 hours

Max Marks: 60

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

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SECTION - I

- 1 (a) Find the internal energy and enthalpy of unit mass of steam of a pressure of 7 bar when, (i) Its quality is 0.8. (ii) it is dry saturated. (iii) Superheated the degree of superheat being 65°C .
- (b) With suitable sketch explain modified Rankine cycle.
- 2 (a) Compare Carnot cycle with Rankine cycle.
- (b) In a Rankine cycle the steam at inlet to turbine is saturated at a pressure of 30 bar and the exhaust pressure is 0.25 bar. Determine the turbine work, pump work, specific work output, Rankine efficiency, Dryness fraction at the end of expansion.

SECTION - II

- 3 (a) Explain with the help of a neat sketch the working of Cochran boiler. State its merits and demerits.
- (b) Differentiate between fire tube boilers & water tube boilers
- 4 (a) Illustrate the purpose of Air preheater and pressure gauges used in boilers
- (b) Schematize Babcock and Wilcox boiler and explain its working principle. State its merits and demerits.

SECTION - III

- 5 (a) A nozzle expands steam from 14 bar and 300°C to 6 bar. If the flow rate is 1 kg/sec find the throat area and exit area. What should be the coefficient of velocity if the exit velocity is 550 m/sec?
- (b) Explain the terms Coefficient of velocity and Coefficient of discharge and Nozzle efficiency.
- 6 (a) With neat sketch explain surface condensers and mention its merits and demerits.
- (b) Steam enters a condenser at 36°C and with barometer reading 760 mm of Hg. If vacuum of 695 mm of Hg. is produced, find the vacuum efficiency.



SECTION - IV

- 7 Draw the velocity diagrams for simple impulse turbine and explain all the notations denoted in the diagram.
- 8 (a) Derive the expression for power produced in the Impulse turbine.
(b) Illustrate the advantages, disadvantages and applications of Impulse turbines.

SECTION - V

- 9 (a) Compare impulse turbine with reaction turbine.
(b) Derive the expression for power produced and efficiency in reaction turbines.
- 10 (a) Draw the combined velocity diagram for moving blades in reaction turbine.
(b) Derive the condition for maximum efficiency and blade height of reaction turbine.

SECTION - VI

- 11 (a) A steam power plant operates on a theoretical reheat cycle. Steam at boiler at 150 bar, 550°C expands through the high pressure turbine. It is reheated at a constant pressure of 40 bar to 550°C and expands through the low pressure turbine to a condenser at 0.1 bar. Draw T-s and h-s diagrams. Find: (i) Quality of steam at turbine exhaust. (ii) Cycle efficiency. (iii) Steam rate in kg/kWh.
(b) Why compounding is necessary in the steam turbines? What are the types of compounding?
- 12 The outlet angle of the blade of a Parson's turbine is 20° and the axial velocity of flow of steam is 0.5 times the mean blade velocity. If the diameter of the ring is 2.25 m and the rotational speed is 3600 rpm. Determine i) Inlet angle of the blade ii) Power developed if dry saturated steam at 5 bar passes through the blade, whose height is 6 cm. Neglect the effect of blade thickness.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester**MATERIAL SCIENCE AND METALLURGY**

(Mechanical Engineering)

Time : 3 hours

Max Marks: 60

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

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SECTION - I

- 1 Draw a neat sketch of BCC crystal structure and calculate its packing factor, coordinate number.
- 2 (a) Explain the modes of plastic deformation.
(b) Explain the Crystal imperfections.

SECTION - II

- 3 Sketch the stress strain curve obtained from tension test on a ductile material.
- 4 Describe Magnetic particle Inspection Method.

SECTION - III

- 5 Draw the Fe-Fe₃C Diagram and label all the points, lines, temperatures and reactions.
- 6 (a) What is phase? What are different types of phase diagrams?
(b) Explain Gibb's phase rule for a metal system.

SECTION - IV

- 7 With a neat sketch, Explain the production of Steel in the Bessemer.
- 8 Explain the extraction of Aluminum and copper, Properties and applications of them.

SECTION - V

- 9 Describe in detail about Carburizing, Nitriding and Flame Hardening.
- 10 What are the heat treatment processes? Explain in detail.

SECTION - VI

- 11 Explain the basic steps in powder metallurgy with advantages and limitations.
- 12 Describe various properties and applications of smart materials and Nano materials.



II B.Tech II Semester**KINEMATICS OF MACHINERY**
(Mechanical Engineering)

Time : 3 hours

Max Marks: 60

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

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SECTION - I

- 1 (a) Explain the classification of kinematic pairs.
- (b) Derive the formula for determining degree of freedom for mechanisms.
- 2 (a) Describe the various types of constrained motions with neat sketches
- (b) Define link. Differentiate rigid, flexible and fluid links.

SECTION - II

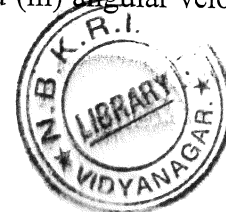
- 3 (a) Sketch and describe the four bar chain mechanism. Why it is considered to be the basic chain?
- (b) Explain any two inversions of a double slider crank chain with neat sketch.
- 4 (a) Sketch and describe the working of the Davis steering gear mechanism.
- (b) How the quick return motion is obtained in crank and slotted lever mechanism? Explain.

SECTION - III

- 5 A four bar mechanism is to be designed, by using three precision points, to generate the function $y = x^{1.6}$ in the range $1 \leq x \leq 3$. The crank rotates from an angle 60° to 120° whereas the follower rotates from an angle 60° to 150° . Find the values of 'x, y, θ and Φ corresponding to the three precision points.
- 6 (a) What is kinematic synthesis? Explain the steps (or types) of kinematic synthesis.
- (b) Define the following terms:
(i) Branch defect (ii) Order defect (iii) Greshof defect

SECTION - IV

- 7 (a) State and prove the 'Aronhold Kennedy's Theorem' of three instantaneous centres.
- (b) Derive an expression for the magnitude and direction of coriolis component of acceleration.
- 8 In a slider crank mechanism, the length of crank and connecting rod are 125 mm and 500 mm respectively. The centre of gravity G of the connecting rod is 275 mm from the slider. The crank speed is 600 r.p.m. clockwise. When the crank has turned 45° from the inner dead centre position, determine:
(i) velocity of the slider, (ii) velocity of the point G, and (iii) angular velocity of the connecting rod.

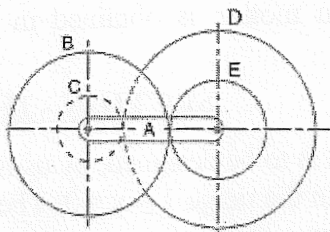


SECTION - V

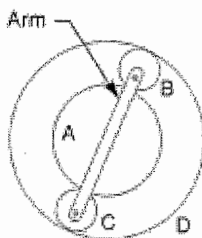
- 9 Two mating involute spur gear of 20° pressure angle have a gear ratio of 2. The number of teeth on the pinion is 20 and its speed is 250 r.p.m. The module pitch of the teeth is 12 mm. If the addendum on each wheel is such that the path of approach and the path of recess on each side are half the maximum possible length, find:
- (i) the addendum for pinion and gear wheel;
 - (ii) the length of the arc of contact; and
 - (iii) the maximum velocity of sliding during approach and recess. Assume pinion to be the driver.
- 10 (a) State and prove the law of gearing.
- (b) Two involute gears of 20° pressure angle are in mesh. The number of teeth on pinion is 20 and the gear ratio is 2. If the pitch expressed in module is 5 mm and the pitch line speed is 1.2 m/s, assuming addendum as standard and equal to one module, find:
- (i) The angle turned through by pinion when one pair of teeth is in mesh ; and
 - (ii) The maximum velocity of sliding.

SECTION - VI

- 11 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 100 r.p.m. clockwise.



- 12 An epicyclic train of gears is arranged as shown in below Fig. The number of teeth on the gears A and D are 40 and 90 respectively. How many revolutions does the arm, to which the pinions B and C are attached, make:
- (i) when A makes one revolution clockwise and D makes half a revolution anticlockwise, and
 - (ii) when A makes one revolution clockwise and D is stationary?



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester**HYDRAULIC MACHINERY**

(Mechanical Engineering)

Time : 3 hours

Max Marks: 60

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

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SECTION - I

- 1 (a) Show that the efficiency of a free jet striking normally on a series of flat plates mounted on the periphery of a wheel can never exceed 50%.
- (b) A jet of water of diameter 50 mm strikes a fixed plate in such a way that the angle between the plate and the jet is 30° . The force exerted in the direction of the jet is 1471.5 N. determine the rate of flow of water.
- 2 Prove that the force exerted by a jet of water on a fixed semi-circular plate in the direction of the jet when the jet strikes at the centre of the semi-circular plate is two times the force exerted by the jet on an fixed vertical plate.

SECTION - II

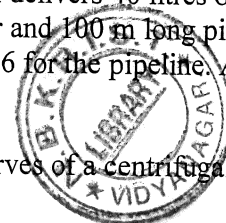
- 3 A Pelton wheel has to be designed for the following data.
Power to be developed = 6000kW; Net head available = 300m; Speed = 550rpm;
Ratio of jet diameter to wheel diameter = 1/10 and overall efficiency = 85%. Find the number of jets, diameter of jet, diameter of the wheel and the quantity of water required
- 4 (a) Define and explain hydraulic efficiency, monomeric efficiency and overall efficiency of a turbine. What is the relation between them?
- (b) Explain the conditions for maximum efficiency of a Pelton wheel turbine.

SECTION - III

- 5 (a) Define the specific speed of a turbine. Derive an expression for the specific speed.
- (b) Explain about the performance characteristics of a turbine.
- 6 A reaction turbine works at 450 r.p.m. under a head of 120 meters. Its diameter at inlet is 120 cm and the flow area is 0.4 m^2 . The angles made by absolute and relative velocities at inlet are 20° and 60° respectively with the tangential velocity. Determine:
a) the volume flow rate b) the power developed c) Hydraulic efficiency

SECTION - IV

- 7 (a) Derive an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water.
- (b) Find the power required to drive a centrifugal pump which delivers 40 litres of water per second to a height of 20 m through a 150 mm diameter and 100 m long pipeline. The overall efficiency of pump is 70% and Darcy's $f = 0.06$ for the pipeline. Assume initial losses in suction pipe equal to 0.33 m.
- 8 Draw and discuss the main and operating characteristic curves of a centrifugal pump.



SECTION - V

- 9 (a) Derive an expression for discharge and work done for a reciprocating pump.
(b) Define cavitation. What are the effects of cavitation? Give the necessary precautions against cavitation.
- 10 A double acting reciprocating pump has piston of diameter 250 mm and piston rod of diameter 50 mm which is on one side only. Length of piston stroke is 350 mm and speed of crank moving the piston is 60 r.p.m. The suction and delivery heads are 4.5 m and 18 m respectively. Determine the discharge capacity of the pump and the power required to operate the pump.

SECTION - VI

- 11 Explain briefly with neat sketches.
a) Hydraulic ram
b) Hydraulic coupling
- 12 Derive an expression for D'Aubuisson's efficiency of a hydraulic ram.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, June 2023

II B.Tech II Semester**STATISTICS AND PARTIAL DIFFERENTIAL EQUATIONS**
(Mechanical Engineering)

Time : 3 hours

Max Marks: 60

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

SECTION - I

1 A random variable X has the following probability function

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² + K

- (i) Determine K (ii) Evaluate $P(x < 6)$, $P(x \geq 6)$, $P(0 < x < 5)$ and $P(0 \leq x \leq 4)$
(iii) if $P(x \leq K) > \frac{1}{2}$, find the minimum value of K and (iv) Determine the distribution function of x (v) find Mean & Variance
- 2 (a) A continuous random variable has the probability density function

$$f(x) = \begin{cases} kxe^{-\lambda x}, & \text{for } x \geq 0, \lambda > 0 \\ 0, & \text{otherwise} \end{cases}$$
 Determine (i) k (ii) Mean (iii) Variance.
- (b) A continuous random variable X has the distribution function

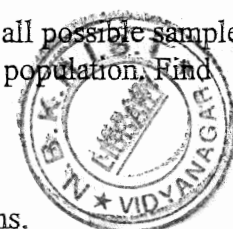
$$F(x) = \begin{cases} 0, & \text{if } x \leq 1 \\ k(x-1)^4, & \text{if } 1 < x \leq 3 \\ 1, & \text{if } x > 3 \end{cases}$$
 Determine (i) f(x) (ii) k (iii) Mean.

SECTION - II

- 3 (a) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) one is defective (iii) $P(1 < X < 4)$.
- (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
- 4 (a) Using the recurrence formula find the probabilities when $x = 0, 1, 2, 3, 4$ and 5; if the mean of Poisson distribution is 3.
- (b) If X is normal variate with mean 30 and standard deviation 5. Find the probabilities that (i) $26 \leq X \leq 40$ (ii) $X \geq 45$.

SECTION - III

- 5 A population consists of a four numbers 5, 7, 11, 15. Consider all possible samples of a size two which can be drawn without replacement from their population. Find
(i) the population mean
(ii) the population standard deviation
(iii) the mean of the sampling distribution of means
(iv) the standard deviation of the sampling distribution of means.
(v) Verify (iii) and (iv) directly from (i) and (ii) using a suitable formulae.



- 6 (a) An industrial engineer intends to use the mean of a random sample of size $n=150$ to estimate the average mechanical aptitude (as measured by a certain test) of assembly line workers in a large industry. If, on the basis of experience, the engineer can assume that $\sigma = 6.2$ for such data, what can he assert with probability 0.99 about the maximum size of his error.
- (b) Determine a 95% confidence interval for the mean of a normal distribution with variance 0.25, using a sample of $n=100$ values with mean 212.3.

SECTION - IV

- 7 The following data show the values of sample mean (\bar{X}) and rang R fro 10 samples for size 6 each. Calculate the values for central line and the control limits for Mean-chart and Range - chart. Draw the control charts and comment on the state of control.

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean (\bar{X})	43	49	37	44	45	37	51	46	43	47
Range (R)	5	6	5	7	7	4	8	6	4	6

- 8 Samples of 100 tubes are drawn randomly from the output of a process that produces several thousand units daily. Sample items are inspected for quality and defective tubes are rejected. The results of 15 samples are shown below.

Sample No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No. of Defective tubes	8	10	13	9	8	10	14	6	10	13	18	15	12	14	9

On the basis of information given above prepare a control char for fraction defectives

SECTION - V

- 9 (a) Form the partial differential equation by eliminating the arbitrary function f from

$$z = xy + f(x^2 + y^2)$$

- (b) Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$, for which $\frac{\partial z}{\partial y} = -2 \sin y$ whne $x=0$ and $z=0$ when y is an odd multiple of $\frac{\pi}{2}$.

10 (a) Solve $\frac{y^2 z}{x} p + xzq = y^2$

(b) Solve $(x^2 - y^2 - z^2) p + 2xy q = 2xz$.

SECTION - VI

- 11 Solve by the method of separation of variables $u_x - 4u_y = 0$ where $u(0, y) = 8e^{-3y}$

- 12 A sting is stretched and fastened to two points l apart. Motion is started by displacing the string in the form $y = a \sin\left(\frac{\pi x}{l}\right)$ from which it is released at time $t = 0$. Show that the displacement of any point at a distance x from one end at time t is given by $y(x, t) = a \sin\left(\frac{\pi x}{l}\right) \cos\left(\frac{\pi ct}{l}\right)$.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ELECTROMAGNETIC TRANSMISSION LINES**
(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 60

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

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SECTION - I

- 1 (a) Formulate the Maxwell's equation in differential form and point form in phasor form.
- (b) Derive Wave equation for free space conditions.
- 2 (a) Explain displacement current density. Obtain the dielectric-dielectric boundary conditions for electric fields .
- (b) A parallel plate capacitor with plate area of 10 cm^2 and plate separation of 43 mm has a voltage $10\sin(10^4 t)$ applied to its plates. Calculate the displacement current assuming $\epsilon = 2.5\epsilon_0$

SECTION - II

- 3 Explain Group velocity and Phase velocity. Differentiate between phase and group velocity. When a wave of 6GHz propagates in parallel conducting plates separated by 3cm, find the V_p and V_g of the wave for dominant wave.
- 4 (a) For a uniform plane wave in space $\lambda = 12\text{cm}$. In a loss less material of unknown characteristics, $\lambda = 8\text{cm}$. In this material $E = 50\text{V/m}$, $H = 0.1\text{A/m}$. find f , μ_r , ϵ_r .
- (b) Explain in detail about Uniform plane waves in lossless media.

SECTION - III

- 5 (a) Define Skin effect and derive the expression for surface impedance.
- (b) Find the skin depth, δ at a frequency of 1.6 MHz in aluminium, where $\sigma = 38.2\text{MS/m}$ and $\mu_r = 1$. Also find the propagation constant, γ and the wave velocity v .
- 6 (a) State and explain Poynting theorem.
- (b) In free space ($z \leq 0$), a plane wave with $H_i = 20\cos(10^4 t - \beta z)\mathbf{a}_x$ mA/m is incident normally on a lossless medium ($\epsilon = 2.5\epsilon_0$, $\mu = 2\mu_0$) in the region $z \geq 0$. Determine the reflected wave H_r , E_r and the transmitted wave H_t , E_t .



SECTION - IV

- 7 (a) Discuss in detail about different polarizations.
(b) Derive the expression for the ratio of reflected to incident electric field strength for an insulator with oblique incidence.
- 8 (a) Explain in detail about snell's law and total internal reflection.
(b) A plane wave travelling in free space is normally incident on the interface with a perfect dielectric with $\epsilon_r = 4$. Compute the magnitudes of incident, reflected and transmitted E and H at the interface. Take $E_i = 2$ mV/m in medium 1.

SECTION - V

- 9 (a) Explain in detail about transmission line parameters.
(b) A certain transmission line operating at $\omega = 10^6$ rad/s has $\alpha = 8$ dB/m, $\beta = 1$ rad/m, and $Z_0 = 60 + j40 \Omega$, and is 2 m long. If the line is connected to a source of $10 \angle 0$ degrees, $Z_g = 40 \Omega$ and terminated by a load of $20 + j50 \Omega$, determine
(a) The input impedance.
(b) The sending-end current
(c) The current at the middle of the line.
- 10 (a) A transmission line operating at 500 MHz has $Z_0 = 80 \Omega$, $\alpha = 0.04$ Np/m, $\beta = 1.5$ rad/m. Find the line parameters R, L, G, and C.
(b) A lossless line has a voltage wave $V(z, t) = V_0 \sin(\omega t - \beta z)$
Find the corresponding current wave.

SECTION - VI

- 11 (a) A 30-m-long lossless transmission line with $Z_0 = 50 \Omega$ operating at 2 MHz is terminated with a load $Z_L = 60 + j40 \Omega$. If $u = 0.6c$ on the line, find
(a) The reflection coefficient Γ
(b) The standing wave ratio s
(c) The input impedance
Without using Smith chart.
(b) Explain in detail the applications of Smith chart.
12. A stub of length 0.12λ is used to match a $60\text{-}\Omega$ lossless line to a load. If the stub is located at 0.3λ from the load, calculate
(a) The load impedance Z_L
(b) The length of an alternative stub and its location with respect to the load
(c) The standing wave ratio between the stub and the load.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ANALOG COMMUNICATION**
(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 60

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

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SECTION - I

- 1 (a) Explain generation of AM using Switching Modulator.
(b) Compare all the Amplitude modulation techniques.
- 2 (a) Explain the principle of operation of Square law detector used for AM detection.
(b) An audio frequency signal $10 \sin(1000\pi t)$ is used to amplitude modulate a carrier of $50 \sin(5\pi \times 10^5 t)$. Calculate (i) Modulation index (ii) Side band frequencies (iii) BW required and (iv) Total power delivered to the load of 600Ω .

SECTION - II

- 3 (a) Explain generation of SSB using phase shift method.
(b) List out the applications of SSB.
- 4 (a) Explain generation of SSB using Frequency discrimination method.
(b) Write a short note on demodulation of SSB waves.

SECTION - III

- 5 (a) With neat diagrams, explain about the VSB modulation system and also explain its applications.
(b) What are the different types of DSB-SC modulators? Explain them.
- 6 (a) Explain the principle of VSB Transmission. What are its advantages over SSB?
(b) Explain how a DSBSC signal is represented in the time and frequency domain.

SECTION - IV

- 7 (a) Derive the expression for Narrow band frequency modulated signal. Draw its Phase representation and compare it with that of AM.
(b) Explain the generation of FM using Armstrong method with a neat block diagram.



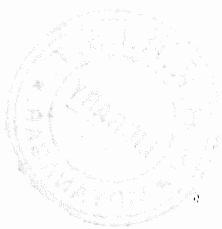
- 8 (a) For an FM modulator with a modulating signal $m(t) = V_m \sin 300\pi t$, the carrier signal $V_c(t) = 8 \sin(6.5 \times 10^6)t$ and the modulator index $\beta = 2$. Find out the significant side frequencies and their amplitude.
- (b) Explain the detection of FM wave using balanced frequency discrimination.

SECTION - V

- 9 (a) Derive the Signal to noise ratios for coherent reception with SSB modulation.
- (b) Why pre-emphasis and de-emphasis are needed in F.M but not in A.M? Explain
- 10 (a) Explain about noise effect in DSB-SC and obtain necessary expression for figure of merit.
- (b) Write short notes on (i) shot noise (ii) Thermal noise.

SECTION - VI

- 11 (a) A super heterodyne receiver having R.F amplifier is tuned to 555kHz. The local oscillator is adjusted to 1010kHz. Then calculate the I.F and image frequency.
- (b) Discuss the factors influencing the choice of intermediate frequency (IF) for a radio receiver.
- 12 (a) With the aid of the block diagram explain TRF receiver. Also explain the basic superheterodyne principle.
- (b) List out the advantages and disadvantages of TRF receiver.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**RANDOM SIGNALS & STOCHASTIC PROCESSES**

(Electronics & Communication 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) If $f(x) = K e^{-|x|}$ is a probability density function in $-\infty \leq x \leq \infty$. Find K, Mean, Variance and $P(0 \leq x \leq 4)$.
- (b) Distinguish between mutually exclusive events & independent events.
- 2 (a) A random variable X assumes the values 'r' with the probability law $P(X = r) = q^{r-1} p$; $r = 1, 2, 3, \dots$, Find moment generating function and hence find Mean and Variance from Moment Generating Function.
- (b) Define probability density function. Prove its properties.

SECTION - II

- 3 (a) Explain in brief about central moment, variance and skew with necessary equations.
- (b) Discuss about Moment Generating Function and state and prove any 3 properties.
- 4 (a) Suppose X and Y are two independent random variables defined in the interval $(0, \theta)$. Define $Z = \min(X, Y)$, $W = \max(X, Y)$. Determine $f_{ZW}(Z, W)$.
- (b) What are the properties of Jointly Gaussian Random variables?

SECTION - III

- 5 (a) Explain Gaussian and Poisson Processes.
- (b) State and prove the cross-correlation function properties.
- 6 (a) Explain about the following random process .
(i) Mean ergodic process (ii) Correlation ergodic process.
- (b) Write short notes on cross power density spectrum.

SECTION - IV

- 7 (a) A stationary random process X(t) is applied to the input of a system for which $h(t) = 3 u(t) t^2 e^{-8t}$. If $E[x(t)] = 2$, what is the mean value of system's response Y(t).
- (b) Derive the expression to find noise band width of the system with necessary explanation.
- 8 (a) Discuss in detail the following random process: (i) Band limited. (ii) Narrow band.
- (b) Elucidate the concept of System evaluation using random noise



SECTION - V

- 9 (a) Discuss about Resistive (Thermal) noise and Effective noise temperature.
(b) A mixer stage has a noise figure of 20dB and this is preceded by an amplifier that has a noise figure of 9dB and an available power gain 15dB. Calculate the overall noise figure referred to the input.
- 10 (a) Explain the process Minimization of mean squared error.
(b) What is the Significance of Mean Squared Error in Noise Calculations?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**ANALOG COMMUNICATIONS**
(Electronics & Communication 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 about any one Generation Method of AM with neat sketches.
(b) Determine the %power saving when carrier and one of the sidebands is suppressed in AM wave when modulated to a depth of 100%
- 2 Summarize the working principle of FDM with its Block diagram.

SECTION - II

- 3 (a) Distinguish between NBFM and WBFM.
(b) Determine the Expression for Transmission bandwidth of FM
- 4 (a) Explain about Nonlinear effects in FM.
(b) Discuss about Multitone FM.

SECTION - III

- 5 Explain about Generation and Detection Methods of PPM with neat sketches.
- 6 (a) What is aliasing effect. How it can be eliminated.
(b) Distinguish between PAM, PDM and PPM.

SECTION - IV

- 7 (a) Discuss about PLL method used in FM.
(b) Outline about Pre-emphasis and De-emphasis.
- 8 (a) Explain about threshold effect in Angle modulation.
(b) Explain about the Noise Performance in SSB and prove that FOM is 1.

SECTION - V

- 9 (a) Classify various AM and FM Broadcast transmitters.
(b) Summarize the Characteristics of Radio receivers.
- 10 (a) Discuss about Tracking used in Super heterodyne receiver.
(b) Recall the factors influencing the choice of intermediate frequency (IF) for a radio receiver.



II B.Tech. II Semester**RANDOM SIGNALS & STOCHASTIC PROCESSES**
(Electronics & Communication Engineering)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

1. (a) Define the following with examples.
i) Sample space ii) Event iii) Mutually exclusive events
- (b) Two cards are drawn from a 52 –card deck (the first is not replaced).
i) Given that first card is a queen, what is the probability that the second is also a Queen?
ii) Repeat part (i) but replace the first card with a queen and the second card with a 7.
2. (a) Define axioms of probability. Also define probability as a relative frequency.
- (b) When two dice are thrown, determine the probabilities from axiom 3 for the following three events .
i) $A = \{\text{sum}=7\}$ ii) $B = \{8 < \text{sum} < 11\}$ iii) $C = \{10 < \text{sum}\}$

SECTION - II

3. (a) Define the probability density function? And State its properties.
The random variable X has the discrete variable in the set $\{-1, -0.5, 0.7, 1.5, 3\}$. The corresponding probabilities are assumed to be a $\{0.1, 0.2, 0.1, 0.4, 0.2\}$. Plot the distribution and density functions.
- (b) let X be a continuous random variable with density function
$$f_X(x) = \begin{cases} \frac{x}{9} + k, & 0 < x < 6. \\ 0, & \text{otherwise} \end{cases}$$

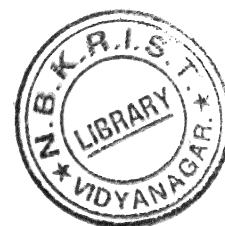
i) Find the value of 'k' ii) find $P(2 < x < 5)$

SECTION - III

5. (a) Define statistical independence of random variables And explain about Point Conditioning in distribution and density functions.
- (b) Random variable X and Y have the density:

$$f_{X,Y}(x,y) = \begin{cases} e^{-\left(\frac{x}{6} + \frac{y}{3}\right)}; & \text{for } x \geq 0, y \geq 0 \\ 0; & \text{elsewhere} \end{cases}$$

Show that X and Y are independent random variables?



- 6 (a) State and prove the properties of correlation function.
(b) Consider two random variables X and Y such that $Y = -6X + 22$. The mean value and the variance of X are 3 and 2 respectively. Find the correlation between X and Y?

SECTION - IV

- 7 (a) What is ACF? State and Prove any four properties of ACF.
(b) Explain about first order, second, wide-sense and strict sense stationary process.
- 8 (a) Explain about mean-ergodic process.
(b) If $x(t)$ is a stationary random process having auto correlation function:
 $R_{XX}(\tau) = 9 + 2e^{-|\tau|}$. Find the mean and variance of the random variable.

SECTION - V

- 9 (a) Find auto correlation function of a random process whose power spectral density is given by $4/(1+(\omega^2/4))$.
(b) Discuss the relation between cross power spectrum and cross correlation function.
- 10 (a) A WSS random process $X(t)$ is applied to the input of an LTI system whose impulse response is $h(t) = 3e^{-t}$. The mean of $X(t)$ is 3. Find the mean output of the system
(b) Find the power density spectrum of response of a linear system.

SECTION - VI

- 11 Derive the impulse response of a Matched filter for white noise.
- 12 (a) Explain the different types of noise sources.
(b) Discuss Effective noise temperature.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**DESIGN AND ANALYSIS OF ALGORITHMS**
(Computer Science & Engineering)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 (a) i) Explain the properties of an algorithm with an example.
ii) Differentiate between Big 'O' and Omega notation with example.
- (b) Give the algorithm for matrix multiplication and find the time complexity of the algorithm using step – count method.
- 2 (a) Write Divide – And – Conquer recursive Merge sort algorithm and derive the time complexity of this algorithm.
- (b) i) Explain the performance Analysis.
ii) Discuss the Pseudo code conventions for expressing algorithms.

SECTION - II

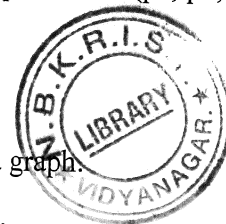
- 3 (a) Find an optimal solution to the knapsack instance $n=7$ objects and the capacity of knapsack $m=15$. The profits and weights of the objects are $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (10, 5, 15, 7, 6, 18, 3)$ $(W_1, W_2, W_3, W_4, W_5, W_6, W_7) = (2, 3, 5, 7, 1, 4, 1)$
- (b) Discuss the single – source shortest paths algorithm with suitable example.
- 4 (a) State the Job – Sequencing with deadlines problem. Find an optimal sequence to the $n=5$ Jobs where profits $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$ and deadlines $(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$.
- (b) What is a Minimum Cost Spanning tree? Explain Kruskal's Minimum cost spanning tree algorithm with suitable example.

SECTION - III

- 5 (a) What is principle of optimality? Explain how travelling sales person problem uses the dynamic programming technique with example.
- (b) What is All – Pair Shortest Path problem (APSP)? Discuss the Floyd's APSP algorithm and discuss the analysis of this algorithm.
- 6 (a) Explain Reliability Design Problem with suitable example.
- (b) Describe the Dynamic 0/1 Knapsack Problem. Find an optimal solution for the dynamic programming 0/1 knapsack instance for $n=3$, $m=6$, profits are $(p_1, p_2, p_3) = (1, 2, 5)$, weights are $(w_1, w_2, w_3) = (2, 3, 4)$.

SECTION - IV

- 7 (a) Write the pseudo code of DFS and explain with the help of a graph.
- (b) Briefly explain the optimal binary search trees with example.



- 8 (a) Describe Bi-connected components.
 (b) Explain union and find operations on sets with a suitable example.

SECTION – V

- 9 (a) Write an algorithm for N – queen’s problem. Give time and space complexity for 8 – queen’s problem
 (b) Give the statement of sum –of subsets problem. Find all sum of subsets for n=4, (w1, w2, w3, w4) = (11, 13, 24, 7) and M=31. Draw the portion of the state space tree using fixed – tuple sized approach.
- 10 (a) How to search an answer node in branch and bound using Least Cost Search? Explain.
 (b) Explain Travelling sales person problem LCBB procedure with the following instance and draw the portion of the state space tree and find an optimal tour.

$$\begin{pmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{pmatrix}$$

SECTION – VI

- 11 Discuss in detail about the class P, NP, NP-hard and NP-complete problems. Give examples for each class.
- 12 (a) Explain the PRAM model for parallel computation and how they handle read conflict bases on various PRAM models.
 (b) Explain non-deterministic algorithm with an example.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B. Tech. II Semester**COMPUTER ORGANIZATION
(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 is bus? Draw the figure to show how functional units are interconnected using Bus and explain it.
(b) List and explain different interconnection structures used in multiprocessors.
- 2 (a) What is addressing mode? Explain the various types of addressing modes with examples.
(b) Write short notes on Instruction formats.

SECTION - II

- 3 (a) Define ROM. Describe Read-Only Memory with its types.
(b) What is Cache memory? Explain the different mapping techniques used in the usage of Cache memory.
- 4 (a) Design a 2M X 32 memory module using memory chips of capacity 512K X 8.
(b) Explain about different levels of RAID.

SECTION - III

- 5 (a) Draw a flow chart to explain how addition and subtraction of two fixed point numbers can be done.
(b) Perform the 2's complement multiplication for the signed integer operands:
(-13) * (10) using Booth's recording scheme.
- 6 (a) Draw the flow chart for division algorithm.
(b) Narrate the steps involved in the multiplication of floating point numbers with a suitable example.

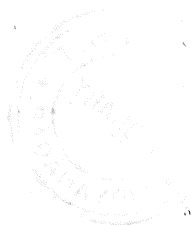


SECTION - IV

- 7 (a) Explain Hardwired control unit for simple CPU with diagram.
(b) Explain why hardwired control unit is faster than micro programmed control unit?
- 8 (a) Explain in brief about I/O Devices.
(b) What are the basic concepts of DMA? Explain the DMA controller with the help of a block diagram.

SECTION - V

- 9 (a) Elaborate on the process of Pipelining.
(b) What are the impacts of branching instructions in the pipelined architecture?
- 10 (a) What is data hazard? Explain the methods for dealing with data hazard.
(b) Explain supper-scalar operation in pipelining.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**FORMAL LANGUAGES AND AUTOMATA THEORY**
(Common to CSE & IT)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 Explain the Central concepts of Automata Theory.
- 2 (a) Discuss Chomsky's Hierarchy of formal languages.
(b) Construct Moore Machine for 1's complement of the binary number.

SECTION - II

- 3 List out the closure properties of regular languages
- 4 Construct an equivalent FA for the given regular expression $(110+101)(0+1)^*$

SECTION - III

- 5 (a) Let G be the context free grammar $S \rightarrow S+S / S^*S / id$,
Find (i) Left Most Derivation
(ii) Right Most Derivation
(iii) Parse Tree.
(b) Show that the grammar $S \rightarrow S+S / S^*S / id$ is ambiguous.
- 6 Eliminate unit and ϵ -productions from the following grammar.
 $S \rightarrow AaB/aaB, A \rightarrow D, B \rightarrow bbA / \epsilon, D \rightarrow E, E \rightarrow F, F \rightarrow aS$

SECTION - IV

- 7 Construct an equivalent PDA for the following language $L = \{a^n b^n / n \geq 1\}$
- 8 Explain about the graphical notation of PDA.

SECTION - V

- 9 Design a Turing Machine for $L = \{a^n b^n c^n / n \geq 1\}$
- 10 Explain the different types of Turing Machine.

SECTION - VI

- 11 (a) Distinguish the problems of Class P and Class NP.
(b) List out the Undecidable problems of Turing Machine.
- 12 $A = (b, bab^3, ba)$ and $B = (b^3, ba, a)$. The input set is $\Sigma = \{0, 1\}$. For the PCP problem, find the solution.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech. II Semester**SOFTWARE PROJECT MANAGEMENT**

(Common to CSE & IT)

Time: 3 hours

Max. Marks: 60

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

* * *

SECTION - I

- 1 (a) Explain the following :
 - i) Trust your team
 - ii) All software engineers are created equal.
- (b) Explain the various activities covered by software project management.
- 2 (a) Give an outline of step wise planning activities for a project with neat diagram.
- (b) How Diagnosing Project Planning Problems will be taken place? Explain.

SECTION - II

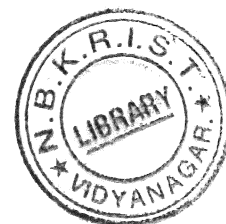
- 3 (a) What is the project budget? Explain different steps in cost estimation. What are the different types of cost need to be considered in cost estimation?
- (b) How do you diagnose estimation problems? Explain.
- 4 (a) Discuss how Multiple Projects will be managed and what are the methods used for managing the multiple projects.
- (b) Explain about Diagnosing Scheduling Problems.

SECTION - III

- 5 (a) Discuss about Version Control with Subversion with an example.
- (b) What do you mean by system testing? Explain Unit Testing.
- 6 (a) Explain about Test Plans and Test Cases by assuming an example.
- (b) Describe how software requirements are documented? State the importance of documentation.

SECTION - IV

- 7 (a) Describe subversion basic work cycle with supporting script.
- (b) Explain about Refactoring.



- 8 (a) Where Testing is used effectively in a Project ? Explain.
(b) Explain the following:
(i)Smoke Tests,
(ii)Test Automation,
(iii)Postmortem Reports

SECTION - V

- 9 (a) What are the methods are used in succeeding the project changes? Explain.
(b) "Progress comes not just from making changes, but from making smart changes". Justify your answer.
- 10 (a) Explain the importance of software quality.
(b) What are the activities of software assessment team? Explain.

SECTION - VI

- 11 (a) Explain how could you Collaborate with the Vendor?
(b) Briefly explain the common causes of outsourced project failures.
- 12 (a) What is software process improvement? Briefly discuss supporting models and certificates.
(b) Discuss about Management Issues in Outsourced Projects.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester**COMPUTER NETWORKS**

(Common to CSE & IT)

Time : 3 hours

Max Marks: 60

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

* * *

SECTION - I

- 1 (a) Explain the four basic network topologies, and cite an advantage of each type.
- (b) Explain the uses of computer networks.
- 2 State the 7 layers of the OSI model in the correct order and briefly describe the function of each layer.

SECTION - II

- 3 (a) Describe sliding window protocol using Go back n.
- (b) Given the dataword 1010011110 and the divisor is 10111, compute the actual codeword at the sender site using modulo binary division and show the checking of the codeword at the receiver site.
- 4 (a) Explain briefly about one-bit sliding window protocol.
- (b) What is meant by PPP? Discuss about framing and transmission phase in it. ?

SECTION - III

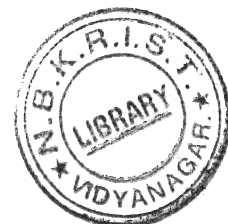
- 5 Explain in detail about data link layer switching.
- 6 (a) What is random access? Explain how it can be achieved with pure ALOHA and slotted ALOHA.
- (b) Explain the carrier sense Multiple Access Protocols.

SECTION - IV

- 7 (a) Discuss link state routing with appropriate diagram.
- (b) Explain closed loop congestion control algorithms.
- 8 Discuss the following:
 - (i) Broadcast Routing
 - (ii) Multicast Routing.

SECTION - V

- 9 (a) Explain user datagram protocol with neat diagram.
- (b) Discuss the IPV4 packet format.
- 10 What is a firewall? Explain in detail.



SECTION - VI

- 11 (a) Discuss about the TCP connection management modeling.
- (b) Explain the procedure of connection establishment in TCP.
- 12 (a) What is the purpose of Domain Name System? Explain.
- (b) Demonstrate the features of E-mail with suitable example.



R-17

Code : 17CS2206

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JUNE 2023

II B.Tech II Semester

PRINCIPLES OF PROGRAMMING LANGUAGES

(Common to CSE & IT)

Time : 3 hours

Max Marks: 60

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

SECTION - I

- 1 (a) Explain in detail about various language evaluation criteria and the characteristics that affect them.
(b) Compare the process of Compilation and Interpretation.
- 2 (a) Discuss about Context-free grammar? Give the parse tree for following statement $A = (B+C) * (D / E)$.
(b) What are the formal methods for describing the syntax of programming languages?

SECTION - II

- 3 (a) Distinguish between data types – arrays and records. Discuss the design issues of arrays.
(b) What is call-by-value and call-by-reference? Give example.
- 4 (a) Define array and record. Classify arrays based on static storage allocation.
(b) What are the advantages and disadvantages of memory allocation during compilation and runtime?

SECTION - III

- 5 (a) Discuss generic subprograms in C++ and Java.
(b) Elaborate the concept of local referencing environment.
- 6 Explain the deep access and shallow access of implementing dynamic scoping.

SECTION - IV

- 7 (a) How would you describe Encapsulation constructs?
(b) Explain the design Issues for Abstract Data Types.
- 8 (a) Explain the concepts of Abstractions and Encapsulation?
(b) Explain parameterized Abstract data types in Ada and C++.



SECTION - V

- 9 (a) Explain the Support for OOP?
(b) Explain the implementation of Object Oriented constructs?
- 10 Explain Object Orient Programming in C#, Ada95, and Ruby.

SECTION - VI

- 11 (a) Explain in detail about Exception handling in C++ and Ada.
(b) Explain Event handling in Java.
- 12 (a) Explain the Fundamentals of FPL?
(b) Differentiate functional and imperative Languages.