Code : 17CE2206

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1   (a)   What are the requirements of an Ideal Alignment? Explain.

    (b)   Explain Highway master plan features.

2   (a)   Briefly discuss the importance of Transportation in the development of any country.

    (b)   What are the factors controlling highway alignment?

SECTION - II

3   (a)   Write briefly about the following cross-sectional elements of a Highway:
          i)   Camber ii) Kerb

    (b)   For the following data given calculate the OSD:
          Design Speed of overtaking vehicle= 100kmph
          Speed of overtaken vehicle= 80 kmph
          Reaction time of the overtaking vehicle driver= 2.0 sec
          Acceleration of overtaking vehicle= 0.5 m/sec^2
          Assume any missing data according to IRC specifications.

4   (a)   Derive the expression for extra widening on curves

    (b)   Design the super elevation required on a horizontal circular curve for the following
          data:
          Design Speed = 60 kmph
          Radius of Circular curve= 350m
          Coefficient of lateral friction= 0.15
          Maximum allowable super elevation= 0.07
          Assume any missing data according to IRC specifications.
SECTION - III

5   (a)   What are the various design factors used in flexible pavement design?

(b) Define CBR value of a soil. Write the design procedure of CBR method of flexible pavement design recommended by IRC

6 (a) What are different types of Pavements? Explain

(b) Discuss the limitations of Group Index method.

SECTION - IV

7 (a) Mention the equations for calculating warping stresses:
   i)   at interior,
   ii) edge and
   iii) corner regions of a rigid pavement using Westergaard's equations modified by Bradbury.

(b) Estimate the wheel load stresses at interior, edge and corner regions of a rigid pavement for the following data:
Design wheel load = 5100 kg
Thickness of pavement = 25 cm
Tyre pressure = 7 kg/cm^2
Radius of Contact area = 15 cm
Modulus of Elasticity of concrete = 3 x 10^5 kg/cm^2
Poisson's ratio= 0.15
Modulus of sub grade reaction = 15 kg/cm^3

8 (a) Write the critical combination of stresses considered in the design of Rigid Pavement in summer and winter seasons. Also mention equations used to calculate the critical stresses.

(b) Draw a neat sketch of an Expansion joint provided in CC Pavement

SECTION - V

9 (a) How the Water Bound Macadam roads are maintained?

(b) What are various materials used in the construction of cement concrete roads? Explain.

10 (a) Differentiate between surface and sub-surface drainage systems

(b) Draw a neat sketch of any one method of surface drainage system.

SECTION - VI

11 (a) List out various vehicle characteristics used in traffic studies

(b) Show the details of following traffic signs:

      i)   Stop Sign
      ii)   Give Way
      iii)   Speed Limit

12   (a)   What are the advantageous of traffic signals?

     (b)   Define the following terms :
        i)   Amber Time
        ii)   Optimum Cycle time
        iii)   PCU
        iv)   Level of Service
        v)   Highway Capacity

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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)   Explain Moment area theorems for finding the deflections of determinate beams.

    (b)   Determine the slope and deflection at the free end of a cantilever beam as shown in Fig. 1 by moment area method. Take E= 2×10^4 N/mm^2, and I= 20000 mm^4.
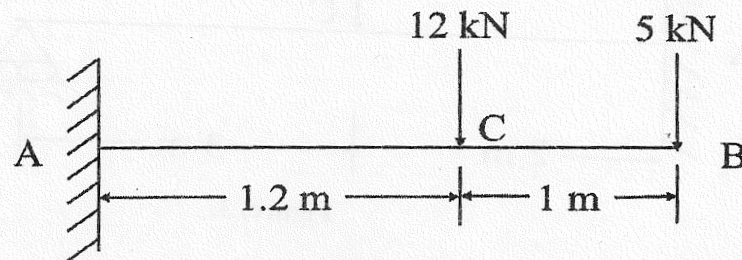

Figure. 1.

2   Analyze continuous beam shown in Fig. 2, by slope deflection method and sketch SFD, and BMD. Take EI constant throughout.
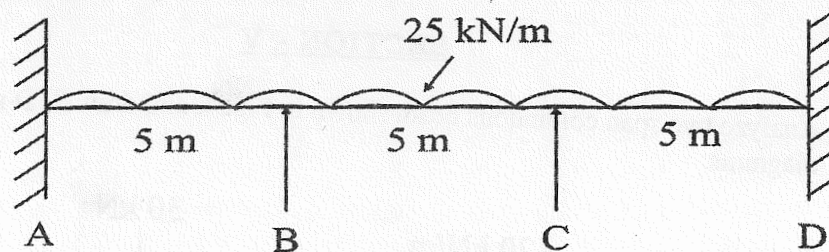

Figure. 2.

SECTION - II

3   Explain briefly about Euler's theory of columns with different end restraints with figures. Also, explain limitations of Euler's theory.

4   A hollow circular section of 3 m long, is fixed at one end and hinged at other end. The section has an external diameter of 150 mm and a thickness of wall is 15 mm. Take Rankine's constant = 1/1600, σ_c= 500 MPa, and E= 80 GPa. Calculate the buckling load using Rankine's formulae.

SECTION - III

5   Explain about direct and bending stresses. Briefly illustrate resultant stresses when a rectangular column is subjected to eccentric loading condition.

6   A short hollow cylindrical column carries a compressive force of 400 kN. The external diameter of the column is 200 mm and internal diameter is 120 mm. Find the maximum permissible eccentricity of the load, if the allowable stresses are 60 N/mm^2 in compression and 25 N/mm^2 in tension.

SECTION - IV

7   Determine the reaction components in the propped cantilever shown in Fig. 3. Take EI as constant throughout.
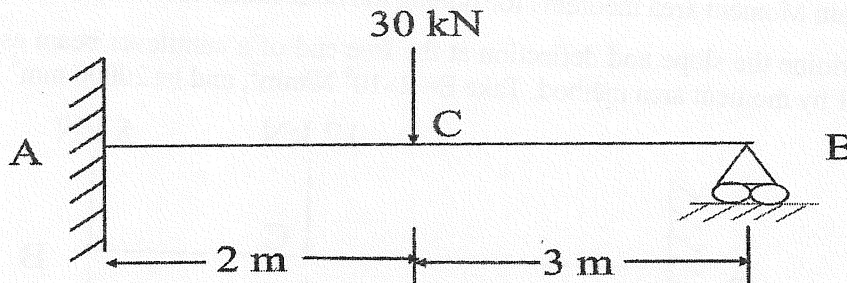

Figure. 3.

8   A fixed beam of length 'L' subjected to a uniformly distributed load of W/unit length over the whole span. Find the fixed end moments developed for the fixed beam. Draw SFD and BMD diagrams.

SECTION - V

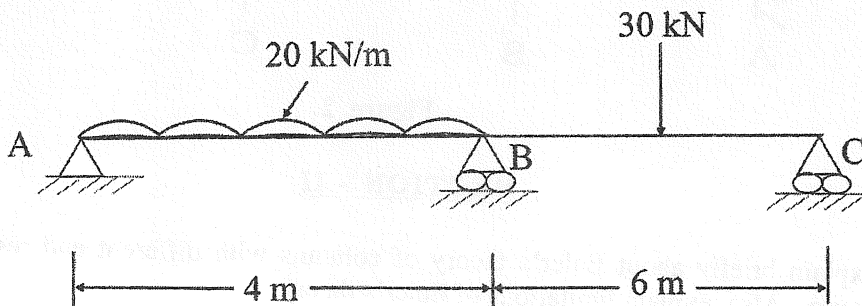9   Analyze two span continuous beam shown in Fig. 4, and draw SFD and BMD diagrams.

Figure. 4.

10 Analyze the continuous beam shown in Fig. 5, and draw SFD and BMD diagrams.

Figure. 5.

SECTION - VI

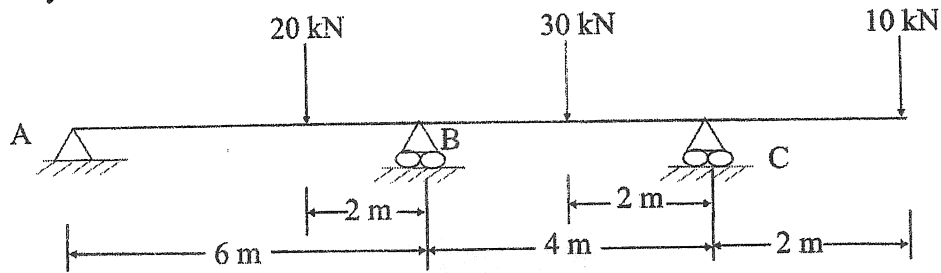11 A simply supported beam of span 6 m shown in Fig. 6. Carries a load of 30 kN at a distance of 4 m from left end support. Using castigliano's theorem, determine the deflection under the load. Assume uniform flexural rigidity- EI.
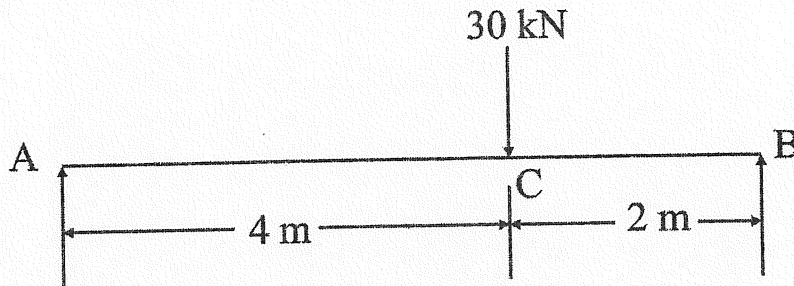

Figure. 6.

12 Determine the vertical and horizontal deflections at the free end of the beam shown in Fig. 7. Take E= 200 kN/mm^2, I= 30×10^7 mm^4.
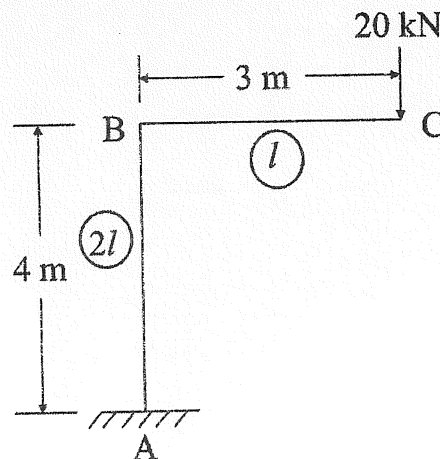

Figure. 7.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
II B.Tech. II Semester
ENVIRONMENTAL STUDIES
(Common for CE & ME)

Time: 3 hours   Max. Marks: 60

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

SECTION - I

1   (a)   What is the scope and importance of the environmental study?

    (b)   What is multidisciplinary nature of environmental studies?

2   (a)   What are the major components of the environment? And discuss in brief.

    (b)   What is the relationship between lithosphere and atmosphere?

SECTION - II

3   (a)   What are the structural and functional components of ecosystem?

    (b)   What are producers, consumers and decomposers give examples?

4   (a)   How does energy flow through food chains and food webs?

    (b)   What are the characteristics of forest ecosystem?

SECTION - III

5   (a)   What are the different types of natural resources and issues associated to them?

    (b)   What causes land degradation and desertification?

6   (a)   What does deforestation affect the most?

    (b)   What are the effects of modern agriculture on environment?

SECTION - IV

7   (a)   What are the biodiversity conservation and its importance?

    (b)   What is hotspot in biodiversity with example?

8   (a)   What are the endangered and endemic species in India?

    (b)   Write down a case study report on Silent Valley.

SECTION - V

9   (a)   What are the main causes of environmental pollution? Explain in brief.

     (b)   What do you mean by noise pollution and explain its effect and control measures?

10   (a)   What are the main causes of nuclear hazards? Explain in brief.

     (b)   How does vermi-composting help the environment?

SECTION - VI

11   (a)   How does urbanization affect natural resources?

     (b)   What were the effects of transportation revolution?

12   (a)   What is sanitation and how can we prevent poor sanitation?

     (b)   What are the main goals of forest conservation Act 1980?

6   Design a simply supported one-way slab provided over a room of size 2.5 m x 5.5 m. It carries a live load of 3.5 kN/m² and lime concrete finishing of 75 mm thick, whose unit weight is 20 kN/m³. The width of the supporting walls is 230 mm. Use M 20 concrete and Fe 250 steel. Assume moderate environment.

SECTION - IV

7   Design an axially loaded short rectangular column with an unsupported length of 3 m. The column is fixed at both the ends. The column has to carry a factored load of 1200 kN. Use M 20 grade concrete and Fe 250 grade steel. Sketch the reinforcement details.

8   Design a short circular column to carry a service load of 500 kN and a service moment of 40 kN.m. The unsupported length of the column is 4 m. The column is fixed at one end and pinned at the other end. Use M 20 concrete and Fe 415 steel. Sketch the reinforcement details.

SECTION - V

9   Design an isolated square footing for a R.C. column of size 400 mm x 400 mm carrying an axial load of 500 kN. The S.B.C. of the soil is 200 kN/m². Use M 25 grade concrete and Fe 415 grade steel.

10   A circular column of 500 mm diameter transfers an axial service load of 600 kN. The safe bearing capacity of the soil is 150 kN/m². Design a circular footing to support the circular column. Use M 20 grade concrete and Fe 415 grade steel.

SECTION - VI

11   Design a dog-legged stair for a building in which the vertical distance between floors is 3.4 m. The stair hall measures 2.5 m x 5 m. The live load may be taken as 3 kN/m². Use M 25 concrete and Fe 415 steel.

12   A rectangular beam has width of 350 mm and an effective depth of 600 mm. The area of tension steel is 4000 mm² and that of compression steel is 1000 mm². Check the deflection requirements for the beam, if it is simply supported over a span of 8 m. Use M 25 concrete and Fe 415 steel.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1   (a)   Explain the following types of sections with reference to limit state design philosophy.

(i) Balanced   (ii) Over-reinforced

(b)   Obtain the design constants for M 30 grade concrete and Fe 415 grade steel.

2   A RC beam has 300 mm width and 500 mm effective depth. Design the beam if it is subjected to a superimposed B.M. of 450 kN.m. Use M 25 concrete and Fe 415 grade steel. Sketch the reinforcement details.

SECTION - II

3   A R.C. beam 300 mm x 450 mm is reinforced with 3 Nos – 20 mm bars with an effective cover of 50 mm. The ultimate shear at the section is 150 kN. Design the shear reinforcement by

a) using vertical stirrups only.

b) bending 1 bar at 45^0

Use M 25 grade concrete and Fe 415 grade steel.

4   A reinforced concrete beam 230 mm x 550 mm depth is subjected to a sagging BM of 40 kN.m., SF of 30 kN and a Twisting Moment of 20 kN.m. at a section. Design the reinforcement at the given section. Take effective cover as 45 mm on both the sides. Use M 25 concrete and Fe 250 steel.

SECTION - III

5   Design a R.C. slab for a room of size 4 m x 5 m. It carries a live load of 2 kN/m^2 and is finished with 20 mm thick granolithic finishing, whose unit weight is 24 kN/m^3. The slab is simply supported on all the four edges with corners free to lift. The width of the supporting walls is 300 mm. Use M 20 concrete and Fe 250 steel.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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

SECTION – I

1 (a) Explain how you would measure the horizontal angle by repetition method with a theodolite.

   (b) The following measurements were made in a closed traverse ABCD: AB=97.54 m; CD = 170.69 m; AD = 248.47 m; <ADC = $39^0 15'$; <DAB = $70^0 45'$. Calculate the missing measurements.

2 (a) What are the different errors in theodolite work? How are they eliminated?

   (b) Write a brief note on temporary and permanent adjustment of transit theodolite.

SECTION – II

3 Explain in detail the Tacheometric constants and their determination

4 Explain the procedure of determination of distances and elevations of points by stadia method.

SECTION - III

5 (a) List out the instrumental methods commonly used for setting out a circular curve and explain in detail Rankine's method of tangential angle.

   (b) Two tangents intersect at chainage 59+60, the deflection angle being $50^0 30'$. Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents if it is intended to set out the curve by offsets from chords. Take peg interval equal to 100 links, length of the chain being equal to 20 meters (100 links)

6 Explain in detail the different types of vertical curves. Explain the procedure of setting out a vertical curve.

SECTION - IV

7 (a) Explain with reference to aerial photographs, what is meant by end overlap and side overlap and why they are provided?

   (b) How do you determine the number of photographs necessary to cover a given area in an aerial survey?

8 (a) What do you understand by remote sensing? Differentiate between active and passive remote sensing.

   (b) Write a detailed note on electro-magnetic energy used for remote sensing.

SECTION - V

9   (a)   Explain in detail the advantages and disadvantages of Total Station.

       (b)   Briefly explain the procedure of determining the horizontal and vertical distance using total station.

10   (a)   Explain in detail about the various parts present in the total station along with the use of it.

       (b)   Write a brief note on the various Sources of Error in Total Station work.

SECTION - VI

11   (a)   Define GPS. Write a brief note on the applications of this in different fields of Civil Engineering.

       (b)   Write a brief note on the different Reference Coordinate Systems for GPS.

12   (a)   What do you understand by spatial data and attribute data? How are they integrated to make a GIS?

       (b)   Why is GIS defined as a knowledge hub?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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)   A single pipe of length 1500 m and diameter 60 cm connects two reservoirs having a difference of 20 m in their water level. The pipe is to be replaced by two pipes of the same length and diameter D to convey 25% more discharge under the same head loss. If the friction factor is assumed to be the same for all the pipes, find the diameter D of the pipes?

   (b)   With neat labeled sketch derive the expression for increase in discharge by providing bye-pass to a pipe.

2   (a)   List the conditions to be satisfied in any network of pipes with neat sketch.

   (b)   A pipeline 0.225 m in diameter and 1580 m long has a slope of 1 in 200 for the first 790 m and 1 in 100 for the next 790 m. The pressure at the upper end of the pipeline is 107.91 kPa; at the lower end is 53.955 kPa. Taking friction factor = 0.032 determine the discharge through the pipe.

SECTION - II

3   (a)   Derive an expression for the pressure drop for viscous flow through the horizontal circular pipe.

   (b)   A plate having an area of 0.6 m^2 is sliding down the inclined plane at 30° to the horizontal with a velocity of 0.36 m/sec. There is a cushion of fluid of 1.8 mm thick between the plane and the plate. Find the viscosity of the fluid if the weight of the plate is 280 N.

4   (a)   Define shear velocity or friction velocity for turbulent flow in circular pipes. Differentiate briefly between laminar flow and turbulent flow through pipes.

   (b)   Oil of viscosity 0.1 Pa.s and specific gravity 0.90, flows through a horizontal pipe of 25 mm diameter. If the pressure drop per meter length of the pipe is 12 kPa, determine i) the rate of flow in N/min; ii) the shear stress at the pipe wall; iii) The Reynolds's number of the flow; and iv) the power required per 50 m length of pipe to maintain the flow.

SECTION - III

5   (a)   The velocity distribution in the boundary layer is given as

$$\frac{v}{V} = \frac{3}{2}\frac{y}{\delta} - \frac{1}{2}\left(\frac{y}{\delta}\right)^2$$ Compute (δ^*/δ) and (θ/δ) where δ^* =Displacement thickness,

θ= Momentum thickness, δ= Nominal thickness of boundary layer.

   (b)   What is the difference between friction drag and pressure drag? In what position should a flat plate be held in a flow to subject the plate to these forces?

6   (a)   Briefly explain the methods of controlling the boundary layer.

   (b)   Calculate the diameter of the parachute to be used for dropping an object weighing 1000 N so that the maximum terminal velocity of dropping is 5 m/s. The drag coefficient for parachute which may be treated as hemispherical is 1.3 and the value of ρ of air 1.216 kg/m^3.

SECTION - IV

7 (a) Derive an expression for discharge through a rectangular notch. Explain how it is modified to take into account the effect of end contraction and velocity of approach.

   (b) A jet of water from an orifice 25 mm diameter under a constant head of 1.5 m falls 0.915 m vertically before it strikes the ground at a distance of 2.288 m measured horizontally from the vena-contracta. The discharge was found to be 102 liters per minute. Determine C_d, C_v and C_c for the orifice.

8 (a) Show that discharge of water through a sharp-edged orifice shall be increased by about 38% if a short cylindrical mouth piece of the same diameter is fitted to it on the outside of the tank. Take coefficient of contraction as 0.62 and neglect friction.

   (b) Determine the discharge over a sharp crested weir 4.5 m long with no end contractions, the measured head over the crest being 0.45 m. The width of the approach channel is 7.5 m and its depth below the crest of the weir is 1 m. Consider velocity of approach in to account.

SECTION - V

9 (a) With a neat labeled sketch explain the working of Francis turbine.

   (b) A jet of water having a velocity of 15 m/s strikes a curved vane which is moving with a velocity of 5 m/s. The vane is symmetrical and it is so shaped that the jet is deflected through 120°. Find the angle of the jet at inlet of the vane so that there is no shock. What is the absolute velocity of the jet at outlet in magnitude and direction and work done per unit weight of water? Assume the vane to be smooth.

10 (a) Find the expression for force exerted by a jet of water on an inclined fixed plate in the direction of the jet.

   (b) A Francis turbine in Srisailam Dam (Constructed in Nallamala Hills) with an overall efficiency of 75% (assumed) is required to produce 110. MW. It is working under a head of 70 m. The peripheral velocity = $0.26\sqrt{(2gh)}$ and the radial velocity of flow at inlet is $0.96\sqrt{(2gh)}$. The wheel runs at 187.5 rpm and the hydraulic losses in the turbine are 22% of the available energy. Assuming radial discharge find the guide vane angle, the wheel vane angle at inlet, diameter of wheel at inlet and width of the wheel at inlet.

SECTION - VI

11 (a) A Pelton wheel is revolving at a speed of 190 rpm and develops 5150.25 KW when working under a head of 220m with an overall efficiency of 80%. Find the unit speed, unit discharge and unit power. The speed ratio for the turbine is given as 0.47. Find the speed, discharge and power when this turbine is working under a head of 140 m.

   (b) With neat labeled sketch, explain the principle and working of centrifugal pump.

12 (a) Define specific speed of turbine. Write the expression to fine the specific speed of turbine. Write the functions of draft tube.

   (b) The diameters of an impeller of a centrifugal pump at inlet and outlet are 30 cm and 60 cm respectively. The velocity of flow at outlet is 2 m/s and the vanes are set back at an angle of 45° at the outlet. Determine the minimum starting speed of the pump if the manometric efficiency is 70%.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1 (a) What is meant by weathering? Describe the agents, process of weathering?

   (b) In a field exploration, a soil sample was collected in a sampling tube of internal diameter 5.0 cm below the ground water table. The length of the extracted sample was 10.2 cm and its mass was 387 g. If $G = 2.7$, and the mass of the dried sample is 313 g, find the porosity, void ratio, degree of saturation, and the dry density of the sample.

2 (a) Derive the relationship between void ratio, degree of saturation, unit weight of soil, unit weight of water and specific gravity of soil solids.

   (b) As per the compaction specification, a highway fill has to be compacted to 95% of standard proctor compaction test density. A borrow area available near the project site has a dry density of 1.65 g/cm³ at 100% compaction and natural void ratio of 0.61 the specific gravity of the soil solids is 2.65. Compute the volume of borrow material needed to construct a highway fill of height 4.5m and length 1KM with side slopes of 1:1.5. The top width of the fill is 8m.

SECTION - II

3 (a) Define and explain the significance of uniformity coefficient and coefficient of curvature

   (b) A sample has plastic limit 15% and field moisture content is 20% using this soil, laboratory liquid limit test was carried out giving the following values:

No of blows (N)	38	27	20	13
Water content (%)	47.5	49.5	51.9	53.9

Determine: i. Liquid limit ii. Flow index iii. Plasticity Index

4 (a) Differentiate between:
         i. Liquid limit and Plastic Limit
         ii. Plasticity and consistency
         iii. Liquidity index and consistency index

(b) A dried soil of 500 gm was subjected to a mechanical analysis with the following result:
Sieve analysis gave the following quantities

Retained on sieve 4.75 mm   50 gm
2.36 mm   50 gm
0.60 mm   100 gm
0.425 mm   150 gm
0.150   50 gm
0.75   50 gm

Draw the grading curve and classify the material according IS Classification.

SECTION - III

5   (a) State Darcy's Law. To what type of soils this law is applicable. State its limitations.

    (b) The falling head permeability test was conducted on soil sample of 4 cm diameter and 18cm length. The head fell from 1m to 0.4m in 20min. If the cross-sectional area of the stand pipe was 1 cm², determine the coefficient of permeability.

6   (a) Describe the method used to construct the flow net?

    (b) Horizontal and vertical permeability of an embankment are 5×10^{-4} m/sec and 3×10^{-4} m/sec respectively. The full reservoir level is 20 m above the downstream. The flow net constructed for the transformed section of the embankment consists of 5 flow channels and 10 equipotential drops. Estimate the seepage loss per meter length of dam.

SECTION - IV

7   (a) The surface of saturated clay deposit is located permanently below the body of water. The average natural water content of clay is 50% and specific gravity of soil solids is 2.72. Calculate the inter granular pressure at a depth of 8 m below the surface of clay layer.

    (b) A standard proctor compaction test was carried out and the following values were recorded. The volume of the mould is 994 CC.

Weight of soil (g)	1772	1837	1860	1871	1906	1865	1850
Water content (%)	17.5	19.0	20.0	20.8	21.8	22.4	24.2

Plot the Dry density vs. moisture content curve and hence find the optimum moisture content and maximum dry density.

8   (a) A concentrated load of 100 kN is applied at the ground surface. Compute the vertical pressure. (i) At a depth of 4m below the load. (ii) At a distance of 3m at the same depth use Boussinesq's equation.

    (b) A circular ring-type foundation for a water tank exerts a uniformly distributed pressure of 25kN/m² on the soil. The external and internal diameters of foundation are 22m and 18m respectively. Find the vertical stress at a depth of 4m below the center of foundation.

SECTION - V

9 (a) Explain the process of consolidation with a mechanistic model.

(b) In a consolidation test the following results have been obtained, when the load was changed for 52 kN/m² to 100kN/m², the void ratio changed from 0.7 to 0.65, Determine the coefficient of volume decrease, m_v and compression index, C_c.

10 (a) Discuss Terzaghi's theory of consolidation, stating the various assumptions and their validity.

(b) A laboratory sample of clay 2cm thick took 15 minutes to attain 60 percent consolidation under double drainage condition. What time will be required to attain the same degree of consolidation for a clay layer of 3m which under the foundation a building for a similar loading drainage condition? What is the value of coefficient of consolidation?

SECTION - VI

11 (a) Explain Mohr Coulomb's shear failure theory.

(b) A sample of dry sand was tested in a direct shear device under a vertical pressure of 137.9 kN/m². Compute the angle of internal friction of the sand. Assume shearing resistance = 96.56 kN/m².

12 (a) Explain with a simple sketch, how triaxial compression test is conducted on a soil sample.

(b) The following results were obtained from a consolidated undrained test on a normally consolidated clay. Plot the strength envelope in terms of total stresses and determine the strength parameters.

Sample No.	Cell Pressure (KN/m²)	Deviator Stress (KN/m²)
1	250	152
2	500	300
3	750	455

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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) The three vertices of a triangle are located at A(-1,2,5), B(-4,-2,-3), and C(1,3,-2).
       (a) Find the length of the perimeter of the triangle.
       (b) Find a unit vector that is directed from the mid point of the side AB to the
           midpoint of the side BC.
       (c) Show that this unit vector multiplied by a scalar is equal to the vector from A to
           C and that the unit vector is therefore parallel to AC .

   (b) State Coulomb's law of force between any two point charges and state the units of
        force.

2 (a)   Express in cylindrical components; (a) the vector from C(3,2,-7) to D(-1,-4,2); (b)
        a unit vector at D directed toward C; (c) a unit vector at D directed toward the
        origin.

   (b) Derive the expression for the electric field intensity due to line charge.

SECTION - II

3 (a) Obtain an expression for the energy stored in electrostatic fields. State its units.

   (b) Define potential gradient and obtain a relation between electric field intensity
        and potential.

4 (a) Derive the expression for capacitance of the spherical condenser.

   (b) Derive an expression for potential gradient

SECTION - III

5 (a) Derive the continuity equation. What is its physical significance?

   (b) Find the total current in a circular conductor of radius 4mm if the current density
        varies according to $J = \dfrac{10^4}{r} A/m^2$

6 (a) Explain the boundary conditions of two perfect dielectrics materials?

   (b) Derive an expression for conduction current density.

SECTION - IV

7 (a) State and prove Ampere's circuital law in point form.

   (b) A steady current of 1000 A is established in a long straight, hollow aluminum conductor of inner radius 1 cm and outer radius 2 cm. Assuming uniform resistivity, calculate magnetic flux density as a function of radius 'r' from the axis of the conductor.

8 (a) Using Ampere's circuital Law, obtain an expression for Magnetic field intensity due to infinite sheet of current.

   (b) What is vector magnetic potential? Derive vector poisson's equation.

SECTION - V

9 (a) Derive the expression for self inductance of solenoid and toroid.

   (b) A toroid has air core and has a cross sectional area of 10mm2 it has 1000 turns and its mean radius is 10mm. find its inductance.

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 Energy stored in magnetic fields

SECTION - VI

11 (a) Explain of Faraday's law for time-varying fields.

   (b) Find the conduction and displacement current densities in a material having a conductivity of 10^{-3} S/m and $\varepsilon_r 2.5$, if the electric field in the material is $E = 5.8 * 10^{-6} \sin(9 * 10^9 t) \, V/m$

12 Write down Maxwell's equations in their integral form. Derive the corresponding equations for fields varying harmonically with time.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

II B.Tech. II Semester

ENGINEERING MATHEMATICS - III
(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 tightly stretched string with fixed end points $x = 0$ and $x = L$ is initially in a position given by $y = y_0 \sin^3\left(\dfrac{\pi x}{L}\right)$ if it is released from rest from this position, find the displacement $y(x,t)$.

2. (a) Solve the by the method of separation of variables
    $\dfrac{\partial u}{\partial x} = 4\dfrac{\partial u}{\partial y}$ and $u(0,y) = 8e^{-3y}$.

    (b) Solve the heat equation $\dfrac{\partial u}{\partial t} = c^2 \dfrac{\partial^2 u}{\partial x^2}$ under the conditions
    $u(0,t) = 0$, $u(L,t) = 0$ for all t; $u(x,0) = f(x)$, $0 < x < L$.

SECTION - II

3. (a) Show that $\dfrac{d}{dx}\left[x^{-n}J_n(x)\right] = -x^n J_{n+1}(x)$.

    (b) Prove that $\displaystyle\int_{-1}^{1} P_m(x)P_n(x)\,dx = \dfrac{2}{2n+1}$, if $m = n$.

4. (a) Prove that $J_{1/2}(x) = \sqrt{\dfrac{2}{\pi x}}\sin x$.

    (b) Show that $(2n+1)xP_n(x) = (n+1)P_{n+1}(x) + nP_{n-1}(x)$.

SECTION - III

5. (a) Show that for $f(z) = \begin{cases} \dfrac{(x^3 - y^3) + i(x^3 + y^3)}{x^2 + y^2}, & z \neq 0 \\ 0, & z = 0 \end{cases}$ the Cauchy-Riemann equations
    are satisfied at the origin but the derivative of $f(z)$ at origin does not exist.

    (b) Find the analytic function $f(z) = u + iv$ where $v = e^x \sin y$.

6. (a) If $w = \phi(x,y) + i\psi(x,y)$ represents the complex potential for an electric field and $\phi = 3x^2 y - y^3$, determine the function ψ.

    (b) Determine the bilinear transformation that maps the points $z_1 = 0$,
    $z_2 = 2i$, $z_3 = -2i$ into the points $w_1 = -1$, $w_2 = 0$, $w_3 = \infty$ respectively.

SECTION – IV

7 (a) State and prove the Cauchy's integral formula.

(b) Evaluate $\int_0^{1+i} (x^2 + iy)\,dz$ along the paths $y = x$ and $y = x^2$.

8 (a) Use Cauchy's integral formula to evaluate $\oint_C \dfrac{e^{3z}}{3z - i}\,dz$ where C is the circle $|z| = 1$.

(b) Use Cauchy's integral formula to evaluate $\oint_C \dfrac{e^{3iz}}{(z+\pi)^3}\,dz$ where C is the circle $|z - \pi| = 3$.

SECTION - V

9 (a) Find Taylor's expansion of $f(z) = \dfrac{z-1}{z+1}$ about the point $z = 1$.

(b) Find the Laurent series of $f(z) = \dfrac{z^2 - 1}{(z+2)(z+3)}$, for $|z| > 3$.

(c) What type of singularity have the function $\dfrac{e^{1/z}}{z^2}$.

10 (a) Evaluate $\oint_C \tan z\,dz$ where C is The Circle $|z| = 2$.

(b) Use residue theorem to evaluate $\int_{-\infty}^{\infty} \dfrac{dx}{(x^2 + 1)(x^2 + 9)}$.

SECTION - VI

11 (a) A random variable X has the following probability function :
Values of X,

x	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

(i) Determine the value of a,
(ii) Evaluate $p(X < 3), p(X \geq 3), p(2 \leq X < 5)$.

(b) In a normal distribution, 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution?

12 (a) Out of 800 families with 4 children each, how many families would be expected to have (i) 2 boys and 2 girls (ii) at least one boy (iii) no girl   (iv) at most two girls? Assume equal probabilities for boys and girls.

(b) If the Probability density of a random variable is given by
$$f(x) = \begin{cases} x & for\ \ 0 < x < 1 \\ 2 - x & for\ \ 1 \leq x < 2 \\ 0 & elsewhere \end{cases}$$
Find the Probabilities that a random variable having this Probability density will take on a value (i) between 0.2 and 0.8; (ii) between 0.6 and 1.2.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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) Interpret the operation of RC high pass circuit as a differentiator.

   (b) A 10V step is switched on to a 50kΩ resistor in series with a 500pf capacitor. Apply the concept of rise time Calculate the rise time of the capacitor voltage, and the time required for the capacitor to be completely charged.

2 (a) Draw and explain the shunt types of clipping circuits with necessary waveforms.

   (b) Construct the circuit diagram of positive peak clamper with necessary justification and show the waveforms.

SECTION - II

3 (a) Illustrate the storage and transition time for diode as a switch with relevant diagrams.

   (b) Generalize the terms pertaining to transistor switching characteristics.
        (i). Rise time. (ii). Delay time. (iii). Turn-ON time. (iv). Storage time. (v). Fall time. (vi) Turn-OFF time.

4 (a) Describe with neat diagram, explain the two-input PMOS NAND gate and NOR gate.

   (b) Illustrate the operation of CMOS inverter with neat diagram.

SECTION - III

5 (a) Discuss the operation of collector coupled monostable multivibrator with necessary circuit diagram and waveforms.

   (b) Derive the expression for frequency of oscillations for astable multivibrator.

6 (a) Examine the working principle of fixed bias binary which shows the unsymmetrical triggering at bases with neat diagram.

   (b) Identify the values of UTP and LTP of emitter coupled bistable multivibrator with hFE=50,Vcc=15V, Rs=1KΩ, R1=2 KΩ, R2 =8KΩ, RC1=6KΩ, RC2=1KΩ and Re=4KΩ.

SECTION - IV

7   (a)   Explain how you generate a saw tooth waveform with a neat circuit diagram.

     (b)   List out the different methods of generating time based voltage waveforms.

8   (a)   Examine the reasons behind the sampling gates are called selection circuits.

     (b)   Obtain the expression for oscillating frequency of UJT sweep generator.

SECTION - V

9   (a)   Classify Power amplifiers based on operating point and conduction angle.

     (b)   Discuss the advantages and disadvantages of direct coupling.

10   (a)   Describe the operation of transformer coupled Class-A power amplifier.

     (b)   Analyze Class-B complementary symmetry power amplifier with neat circuit diagram.

SECTION - VI

11   (a)   Define Q factor and discuss the importance of tuned amplifiers.

     (b)   What is the problem in double tuned amplifier and how it is solved in stagger tuned amplifier, explain with necessary waveforms.

12   With neat circuit diagram, explain the stagger tuning operation and also draw necessary graph.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
II B.Tech II Semester
TECHNICAL ENGLISH & SOFT SKILLS
(Common to EEE ECE,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   Assume that you are giving a technical presentation in a paper presentation contest. How would you plan and prepare for delivering an effective presentation ?

2   ' Style' is a major consideration in technical communication – Discuss.

SECTION - II

3   What are the strategies you follow in order to win in a group discussion?

4   Write short notes on i) Initiation 2) Intervention 3)Summarization in the GD.

SECTION - III

5   Assume that you are applying for the post of Design Engineer and prepare a resume.

6   What is the difference between Bio-data? Resume and a Curriculum vitae .

SECTION - IV

7   What do you mean by Kinesics and Haptics?

8   What are the four types of Proxemic communication?

SECTION - V

9   What are the characteristics of an effective leader ?

10   Soft skills are as important as domain skills in the corporate world. Do you agree? If so, explain.

SECTION - VI

11   What is the importance of etiquette and write in detail about interview etiquette and telephone etiquette?

12   Explain the acronym **SMART** goal and elaborate on how a SMART goal increases the chances of achieving a goal.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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) Derive the EMF equation of transformer.

   (b) A 220 V , 2.8 KVA single phase transformer has an iron loss of 120 W at 45 Hz and 70 W at 35 Hz. Find the hysteresis and eddy current losses at 50 Hz.

2. (a) Explain how 2-winding transformer is realized as auto transformer.

   (b) Derive the expression for saving of copper when an auto transformer is used.

SECTION - II

3. (a) Develop the exact equivalent circuit of a 1-phase transformer. From this derive the approximate and simplified equivalent circuits. State the various assumptions made?

   (b) Following readings were obtained from O.C. and S.C. tests on a 8 kVA, 400/120V, 50 Hz transformer: O.C. Test: (l.v. side) : 120 V; 4 A; 75 W
   S.C. Test: (h.v.side) : 9.5 V; 20 A; 110W
   Obtain i) Voltage regulation and efficiency for 0.8 lagging power factor load, and ii) The efficiency at half full – load and 0.8 power factor load.

4. (a) Explain Sumpner's test on single phase transformer and also list its advantages?

   (b) In a Sumpner's test on two identical single – phase transformers rated 750 kVA, 11/0.5 kV, 50 Hz the wattmeter reading on h.v side is 8000 W and on the l.v side is 16000W. Find the efficiency of each transformer on half full load and 0.78 power factor. What will be its maximum efficiency

SECTION - III

5. (a) Explain about three phase to two phase transformation using Scott connection.

   (b) Two single phase transformers are supplied at 250V from a 6600 V, 3-phase system through a pair of Scott-connected transformers. If the load on the main transformer is 85 kW at 0.9 p.f. lagging and that on teaser transformer is 69 Kw at 0.8 p.f. lagging, find the values of line currents on the 3-phase side. Neglect the magnetizing and core loss currents in the transformers?

6   What are distinguishing features of Y-Y, Y-Δ, Δ-Y and Δ-Δ three phase connections? Compare their advantages and disadvantages?

SECTION - IV

7   (a) Describe the principle of operation of three phase induction motor. Explain why the rotor is forced to rotate in the direction of rotating magnetic field.

(b) Derive the expression for the torque of an induction motor and obtain the condition for maximum torque.

8   (a) A three phase, 400 V, 50 Hz induction motor takes a power input of 35 kW at its full load speed of 980 rpm. The total stator losses are 1 kW and the friction and windage losses are 1.5 kW. Calculate (i) slip (ii) rotor ohmic losses (iii) shaft power (iv) shaft torque and (v) efficiency.

(b) Draw the torque-slip characteristics of a 3-phase induction motor. Explain them briefly?

SECTION - V

9   (a) What are no load and blocked rotor tests? What sort of losses can be measured by these tests?

(b) An 8 – pole, 50 Hz, 3 phase induction motor is running at 4% slip when delivering full load torque. It has stand still rotor resistance of 0.1 Ω and reactance of 0.6 Ω per phase. Calculate the speed of the motor if an additional resistance of 0.5 Ω per phase is inserted in the rotor circuit. The full load torque remains constant.

10   (a) Explain briefly the different methods of speed control of 3 –phase induction motors.

(b) Draw the circle diagram for a 400V , 5 H.P delta connected 3-phase induction motor form the following test results(line Values):
   No load test: 400V, 3.0 A, cosΦ0 =0.2
   Short circuit test: 200V, 12.0A, cosΦ =0.4
From the circle diagram determine
   a) Full load current   b) Full load power factor
Assume the copper losses to be equally divided between the stator and rotor.

SECTION - VI

11   Explain in detail various types of starters used for squirrel cage motor?

12   (a) Draw the equivalent circuit of double cage induction motor and derive its torque equation.

(b) Write a short nodes on the principal and operation of Induction generator.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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) Explain in detail about primary and secondary Distribution system.

   (b) Give the classification of distribution systems and compare AC and DC distribution systems.

2   A 2-wire D.C distributor AB is fed from both ends. At the feeding point A the voltage is maintained at 240 V and at B is 245 V. The total length of the distributor is 200 meters and loads are tapped off as under: 25A at 50 meters from A; 50A at 75 meters from A; 30A at 100 meters from A; 40A at 150 meters from A. If the resistance per Km of one conductor is 0.3Ω, solve: i) The currents in the various section of the distributor ii) The minimum voltage and the point at which it occurs. iii) The power dissipated in the distributor.

SECTION – II

3 (a) Derive an expression for inductance per km of a 3 phase un transposed transmission line with equilateral spacing of D between the conductors.

   (b) An overhead line of 50kms length is to be constructed for a single-phase transmission. The diameter of the conductors is 2.5cm. Find the maximum permissible spacing between the lines if the inductive reactance is not to exceed 31 Ω

4 (a) Derive an expression for the capacitance per km of a single phase line taking into account the effect of ground. Assume that the distance between the conductors is D and the radius of the conductor is r. The conductors are at a height H from the ground.

   (b) A 3-phase overhead transmission line has its conductors arranged at the corners of an equilateral triangle of 3m side. Find the capacitance of each line conductor per km. Given that diameter of each conductor is 1.25cm.

SECTION – III

5 (a) Explain why receiving end voltage of an unloaded long line may be more than the sending end voltage.

   (b) A 3-phase 220 kV, 50 Hz, transmission line consists of 3 cm diameter conductors spaced 2 meters apart in equilateral triangle formation .If the temperature is 200 C and atmospheric pressure 75 cm. Solve the corona loss per km of the line. Take irregularity factor as 0.8

6   (a)   Explain in detail about effect of the corona on the communication lines.

     (b)   Explain about Skin and Proximity effect.

SECTION – IV

7   (a)   Explain why the potential distribution is not, in general, uniform over the string in a suspension type of insulators.

     (b)   In a string of 3 units, the capacitance between each link to pin to earth is 11% of the capacitance of one unit. Solve the voltage across each unit and string efficiency when the voltage across the string is 33kV

8   (a)   Explain about the various methods to improve the string efficiency.

     (b)   Each of the three insulators forming a string has a self-capacitance of 'C' Farads. The shunting capacitance of the connecting metal work of each insulator is 0.3 C to earth and 0.2 C to the line. A guard ring increases the capacitance to the line of the metal work of the lowest insulator to 0.5 C. Calculate the string efficiency of this arrangement with the guard ring.

SECTION – V

9   (a)   Derive the expression for sag and tension when the supports are at equal heights.

     (b)   Determine the maximum sag of an overhead line conductor having a diameter of 19.5 mm weighs 0.85 kg/m. The span length is 275 meters, wind pressure is 40 kg/m2 of projected area with ice coating of 13 mm. The ultimate strength of the conductor is 8000 kg, the factor of safety is 2 and ice weighs 910kg/m3.

10   (a)   Derive the expression for sag and tension when the supports are at unequal heights.

     (b)   An Over head transmission line at a river crossing is supported from two towers at height of 40m and 90m above water level, the horizontal distance between the towers being 400m.If the maximum allowable tension is 2000kg. Determine the clearance between the conductor and water at a point mid-way between the towers, Weight of the conductor is 1kg/m.

SECTION – VI

11   (a)   Write a short note on single core cable with a neat diagram.

     (b)   A 12.5 kV single-core cable has an outside diameter of 8 cm. Solve the radius of the core and the electric field strength that must be withstand by the insulating material in the most economical (optimal-ratio) configuration.

12   (a)   Explain about capacitance of a 3 phase belted cable.

     (b)   A single core 2 km long cable has a conductor radius of 1.3cm and an insulation thickness of 3.5 mm. If the resistivity of dielectric is 7×1012 ohm-m. Calculate the insulation resistance of the cable.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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　(a)　List and explain the common operations which can be carried out on lathe.

　(b)　Explain taper turning by setting over the tail stock.

2　(a)　Explain the thread cutting operation on lathe machine.

　(b)　Give the detailed comparison between a turret lathe and capstan lathe.

SECTION - II

3　Explain the specifications of a radial drilling machine with a neat sketch. Explain the difference between drilling and boring.

4　(a)　Explain the working principle of a slotting machine with a neat sketch.

　(b)　What is the planer? Illustrate its applications.

SECTION - III

5　(a)　Sketch and describe a vertical milling machine.

　(b)　Draw a neat sketch of a plain milling cutter and label its various elements.

6　Explain compound indexing for a milling machine with suitable example.

SECTION - IV

7　(a)　Explain grinding wheel designation system.

　(b)　Give neat sketches of internal pull type broach and indicate the various terms relative to its teeth.

8　(a)　Explain truing and dressing of grinding wheels.

　(b)　Compare grinding honing and lapping.

SECTION - V

9　What is EBM? Sketch its set up an indicate its main parts and explain the priciple of operation.

10　Explain the principle of PAM with sketch. List out the advantage and limitation of PAM process.

SECTION - VI

11　Explain about principle feature of automatic lathe.

12　(a)　Write about fixed automation and programmable automation.

　(b)　What are the various situations where automation is preferred over manual labor?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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)   A random variable X has the following probability distribution

X	1	2	3	4	5	6	7	8
P(X)	K	2K	3K	4K	5K	6K	7K	8K

        Find the value of i) K   ii) $P(X \leq 2)$ iii) $P(2 \leq x \leq 5)$.

   (b)   Calculate expectation and variance of X, if the probability distribution of the random variable X is given by

X	-1	0	1	2	3
F	0.3	0.1	0.1	0.3	0.2

2   (a)   Probability density function of a random variable X is $f(x) = \begin{cases} \frac{1}{2}sinx, & for\ 0 \leq x \leq \pi \end{cases}$. Find the mean, mode and median of the distribution and also find the probability between 0 and $\frac{\pi}{2}$.

   (b)   For the continuous probability function $f(x) = k\,x^2 e^{-x}$ when $x \geq 0$, then find i) K. ii) Mean, iii) Variance.

SECTION – II

3   If the probability that an individual suffers from a bad reaction of certain injection is 0.001. Determine the probability that out of 2000 individuals   (i) exactly 3

             (ii) more than 2

             (iii) none

             (iv) more than 1, suffer a bad reaction.

4   (a)   The life of electronic tubes of a certain type may be assumed to be normal distribution with mean 155 hours and S.D. 19 hours. Determine the robability that the life of tube

             (i) Between 136 hours to 174 hours

             (ii) Less than 117 hours

             (iii) More than 195 hours

   (b)   Using recurrence formula find the probabilities when x = 0, 1, 2, 3, 4 and 5; if the mean of the Poisson distribution is 3.

5   If the population is 3,6,9,15,27

             (i)   List all possible samples of size 3 that can be taken without replacement from the finite population.

             (ii)   Calculate the mean of each of the sampling distribution of means.

             (iii)   Find the standard deviation of sampling distribution of means.

6   (a)   Define the Estimator and Statistical Estimation.

       (b)   What is the maximum error one can except to make with probability 0.90 when using the mean of a random sample of size n=64 to estimate the mean of population with $\sigma^2 = 2.56$.

SECTION – IV

7   (a)   Write the advantages of statistical quality control.

       (b)   The following are the mean lengths and ranges of lengths of a finished product from 10 samples each of size 5. The specification limits for length are 200±5 cm. Construct $\bar{x}$ and R charts and examine whether the process is under control and state your recommendations

Sample no.	1	2	3	4	5	6	7	8	9	10
Mean$\bar{x}$	201	198	202	200	203	204	199	196	199	201
Range R	5	0	7	3	4	7	2	8	5	6

       Assume for n = 5, A2 = 0.577, D3 = 0, D4 = 2.115.

8   (a)   Explain the control charts for variables.

       (b)   Write the short note on statistical quality control.

SECTION – V

9   (a)   Form a partial differential equation by eliminating the arbitrary functions $\phi1$ & $\phi2$ from $z = \phi1(x + iy) + \phi2(x - iy)$.

       (b)   Form the partial differential equation by eliminating the arbitrary constants from $z = (x-a)^2 + (y-b)^2 + 1$

10   Find the general solution of $(x^2 - yz)p + (y^2 - zx)q = ((z^2 - xy))$

SECTION – VI

11   (a)   Solve by the method of separation of variables $4u_x + u_y = 3u$ and $u(0, y) = 3e^{-y} - e^{-5y}$

       (b)   A tightly stretched string with fixed end points $x = 0$ and $x = l$ is initially at rest in its equilibrium position. If it is set to vibrate by giving each of its point a velocity $\lambda x(l - x)$, find the displacement of the string at any distance x from one end at any time t.

12   Solve the one dimensional heat flow equation $\frac{\partial u}{\partial t} = C^2 \frac{\partial^2 u}{\partial x^2}$ given that $u(o, t) = 0, u(L, t) = o, t > 0$ and $u(x, 0) = 3\sin\left(\frac{\pi x}{L}\right), 0 < x < L$.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1   (a)   Define the following.
            (i). Kinematic link   (ii). Kinematic pair   (iii). Degrees of freedom

     (b)   Discuss completely constrained motion and In-completely constrained motion with suitable example.

2   Derive the formula for determining degree of freedom for mechanisms. Using Grubler's criterion for plane mechanism, prove that the minimum number of binary links in a constrained mechanism with simple hinges is four

SECTION - II

3   (a)   Discuss the various inversions of slider crank chain mechanism

     (b)   Explain Grashoff's law. What is the significance of Grashoff's law?

4   (a)   Discuss the inversions of quadratic chain mechanism

     (b)   Discuss steering gear mechanism and the condition for correct steering with a diagram.

SECTION - III

5   A four bar mechanism is to be designed, by using three precision points, to generate the function $= x^{1.5}$, for the range $1 \leq x \leq 4$. Input link is to start from 30^0 and to have a range of 90^0. The output link is to start at 0^0 and to have a range of 90^0. Find out values of 'x, y, θ and Φ corresponding to the three precision points.

6   (a)   Explain the different defects possible in the synthesized mechanisms. How to overcome these defects.

     (b)   Describe Frudenstein method for four bar mechanism.

SECTION - IV

7   A pin joined four bar mechanism as shown in Fig.1, has various dimensions as follows: AB= 300mm, BC=CD=360mm, and AD=600mm. The angle BAD=60^0. The crank AB rotates uniformly at 100 rpm. Locate all the instantaneous centers and find the angular velocity of the link BC.
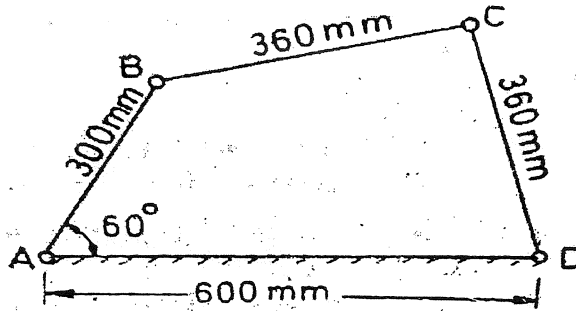

Fig.1

8   The mechanism of a radial valve gear is shown in Fig. 2. The Crank OA turns uniformly at 150 rpm and is pinned at A to rod AB. The point C in this rod is guided in the circular path with D as center and DC as radius. The dimensions of the various links are :
OA=150 mm, AB=550 mm, AC= 450 mm, DC= 500 mm, BE= 350mm.
Determine the velocity and acceleration of the am E for the given position of the mechanism.
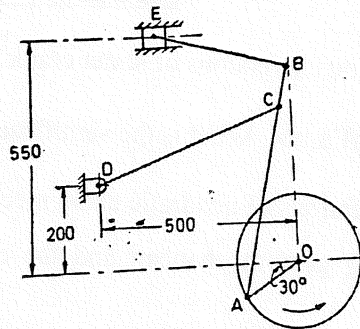

Fig. 2

SECTION - V

9   The pitch circle radii of two involute spur gears in mesh are 51.5 mm and 64.2 mm. The outer circle radii are 57.5 mm and 71.2 mm respectively. The operating pressure angle being 20°. Determine
   (i)   Length of path of contact
   (ii)   contact ratio if the number of teeth on the gear is 20
   (iii)

10   Two gear wheels mesh externally and are to give a velocity ratio of 3:1. The teeth are of involute form, module =6 mm, addendum= 1 module, pressure angle = 20°. The pinion rotates at 90 rpm. Determine:
   (i) The number of teeth on the pinion to avoid interference on it and the corresponding number of teeth on the wheel
   (ii) The length of path and arc of contact
   (iii)The number of pairs of teeth in contact
   (iv)The maximum velocity of sliding.

11   In a reverted epicyclic gear train shown in fig. 2, 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 rpm clockwise
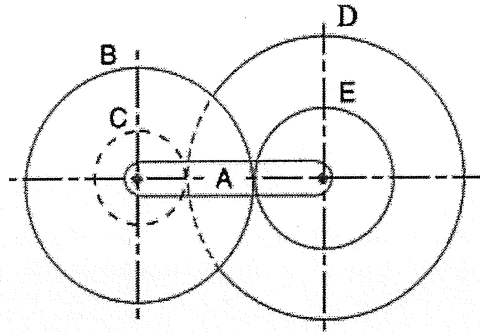

Fig. 2

12   An eipicyclic gear train as shown in Fig. 3 has sun wheel S of 30 teeth and two planet wheels P, P of 50 teeth. The planet wheels mesh with the internal teeth of a fixed annulus A. The driving shaft carrying the sun wheel transmits 4kW at 300 rpm. The driven shaft is connected to an arm which carries the planet wheels.
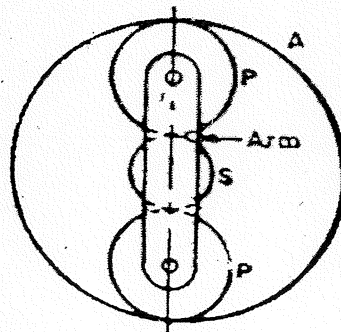

Fig. 3

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1 (a) Define the term impact of jets

   (b) A jet of water of diameter 60mm moving with a velocity of 40 m/sec, strikes a curved fixed symmetrical plate at the centre. Determine the force exerted by the jet of water in the direction of the jet, if the jet is deflected by an angle of 160 degrees at the outlet of the curved plate

2 (a) Derive the equation for the force exerted by a jet on stationary inclined flat plate

   (b) A jet of water of diameter of 100mm strikes a curved plate at its center with a velocity of 15m/s .the curved plate is moving with a velocity of 7 m/s in the direction of jet. The jet is deflected trough an angle of 150^0. Assuming the plate smooth fine: (1).force exerted on the plate in the direction of the jet. (2) power of the jet (3) efficiency

SECTION - II

3 Draw inlet and outlet velocity triangles for a Pelton turbine and indicate the direction of various velocity components. Also obtain an expression for the work done per second by water on the runner of the Pelton wheel.

4 (a) Write a brief note on classification of turbines.

   (b) A pelton wheel has to be designed for the following data: power to be developed =6000 kW,Net head available = 400 m, speed = 550 rpm, Ratio of jet diameter to the wheel diameter =1/10 and overall efficiency = 85%. Find the number of jets, diameter of jet, diameter of the wheel and quantity of water required.

SECTION - III

5 (a) Define the following;
       i. Unit speed   ii. Unit discharge   iii. Unit power   iv. Degree of reaction

   (b) Discuss about various parts of radial flow reaction turbines.

6 (a) Give the classification of turbines.

   (b) A Kaplan turbine develops 24647.6 KW power at an average head of 39 m. assuming speed ratio of 2, flow ratio of 0.6, diameter of the boss = 0.35 x diameter of the runner and an overall efficiency of 90%. Calculate the diameter, speed and specific speed of the turbine

SECTION – IV

7 (a) How will you find an expression for the minimum speed for starting a centrifugal pump?

   (b) The diameters of an impeller of a centrifugal pump at inlet and outlet are 20 cm 40 cm respectively. Determine the minimum speed for starting the pump if it works against a head of 25 cm

8 (a) What do you mean by manometric efficiency, mechanical efficiency and overall efficiency of a centrifugal pump?

   (b) Define the specific speed of a centrifugal pump. Derive an expression for the same.

SECTION - V

9 Explain the working principle of single acting reciprocating pump with the help of neat sketch and Obtain an expression for work done by reciprocating pump

10 (a) A single stage centrifugal pump with impeller diameter of 30 cm rotates at 2000 rpm and lifts 3 m3 of water per second to a height of 30 m with an efficiency of 75%. Calculate the no. of stages and diameter of each impeller of a similar multistage pump to lift 5 m3 of water per second to a height of 200 m when rotating at 1500 rpm.

   (b) What is negative slip in a reciprocating pump? What are the causes for it

SECTION - VI

11 Explain briefly with neat sketches.
      a) Hydraulic press
      b) Hydraulic accumulator

12 Explain briefly with neat sketches.
   (a) Hydraulic Lift
   (b) Hydraulic coupling

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1   (a)   Draw the configuration, p-V and T-s diagrams of a simple Rankine steam power cycle and explain its working principle.

      (b)   A vessel having a capacity of 0.04 m^3 contains a mixture of saturated water and saturated steam at a temperature of 250^{0}C. The mass of the liquid present is 9 kg. find the following :
    (i) the pressure   (ii) the mass   (iii) the specific volume
    (iv) the specific entropy   (v) specific enthalpy   (vi) the specific internal energy.

2   (a)   Explain why Rankine cycle is the ideal cycle of reference and not the Carnot cycle for stem power plant.

      (b)   A mass of wet steam at temperature 165^{0}C is expanded at constant quality 0.8 to pressure 3 bar. It is then heated at constant pressure to a degree of superheat 65^{0}C. Find the enthalpy and entropy changes during expansion and during heating.

SECTION - II

3   (a)   Describe the working of Benson boiler with a neat sketch mentioning its distinguishing features.

      (b)   Explain (i) Economiser, (ii) Safety valve and (iii) Air preheater.

4   (a)   Explain (i) Fusible plug, (ii) Super heater and (iii) Blow off cock.

      (b)   What are the essentials of a good steam boiler? Estimate the factors which should be considered while selecting a boiler.

SECTION - III

5   (a)   Derive the equation for critical pressure ratio in nozzles.

      (b)   What are the sources of air into the condenser? State the effects of air leakage on the performance of a condenser.

6   (a)   What is the effect of friction on the flow through a steam nozzle? Explain with the help of h-s diagram.

      (b)   If a barometer stands at 760 mm of Hg and a condenser vacuum is at 700 mm of Hg while temperature is 30^{0}C, calculate the mass of air per kg of uncondensed steam and vacuum efficiency.

SECTION - IV

7   (a)   What is a steam turbine? How these are classified? State the applications.

     (b)   In a simple impulse turbine the nozzle delivers 25 kg/s steam. The nozzle angle is 15^0. The steam issue from the nozzle with a velocity of 900 m/s. The steam blade velocity is 350 m/s and the inlet and outlet angles of the blade are equal. Neglecting friction, calculate the blade angles and power developed.

8   (a)   Draw a combined velocity diagram with reference to steam turbine. Name and mark all angles and velocities on it. Write the equation for tangential force and power developed.

     (b)   In a De Laval turbine, the steam enters the wheel through a nozzle with a velocity of 450 m/s and at angle of 15^0 to the direction of motion of the blade. The blade speed is 1800 m/s and the exit angle of the moving blade is 20^0. Find the inlet angle of the moving blade and exit velocity of steam.

SECTION - V

9   (a)   Define the term "degree of reaction" as applied to a steam turbine. Show that for Parson's reaction turbine the degree of reaction is 50%.

     (b)   A reaction turbine has a drum diameter of 2.15 m with speed of 750 rpm. The blades at certain location are 0.16 m high and the discharge angle is 25^0. The steam is under a pressure of 0.4 bar with dryness fraction of 0.97. If the seam consumption is 14.5 kg/s, find the power developed by the turbine.

10   (a)   Make a comparison between the impulse and reaction type steam turbine.

     (b)   A 50% reaction turbine (with symmetrical velocity triangles) running at 400 rev/min has the exit angle of the blades as 20^0 and the velocity of steam relative to the blades is 1.35 times the mean blades speed. The steam mass flow rate is 8.33 kg/s and at a particular stage the specific volume is 1.381 m³/kg. For this stage, find out the blade height if the rotor mean diameter is 12 times blade height.

SECTION - VI

11   (a)   Draw the line diagram and explain the pressure compounded impulse turbine.

     (b)   Describe various methods of steam turbine governing.

12   (a)   Draw the line diagram and explain the velocity compounded impulse turbine.

     (b)   Explain reheat and regenerative cycles of steam turbines with neat sketches.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
II B.Tech II Semester

MATERIALS 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
* * *

SECTION - I

1 (a) Calculate the packing efficiency of monoatomic BCC and close packed structure HCP.

   (b) What are the Miller indices? How are they determined? State their significance.

2 (a) Compare between an Edge Dislocation and a Screw Dislocation.

   (b) Explain the plastic deformation by twinning clearly.

SECTION - II

3 (a) Describe tensile test on UTM. Draw stress-strain diagram for ductile materials indicating the salient points.

   (b) What are the different hardness tests? Describe Rockwell hardness test with suitable sketch

4 (a) Explain how a creep test is conducted. What are the various stages of creep curve.

   (b) State the differences between destructive and non-destructive tests.

SECTION - III

5 (a) Draw a typical equilibrium diagram for two metals completely soluble in liquid and solid states. Name the various phases in the diagram.

   (b) Explain Peritectic system and Eutectoid system with neat sketches.

6 (a) State the distinguishing features of eutectic and eutectoid reactions in iron carbon system.

   (b) Explain the cooling of hypereutectoid steel from austenite state to room temperature.

SECTION - IV

7 (a) Describe the production of Cast iron in cupola.

   (b) Explain the application and limitation of carbon steel.

8 (a) Describe various stages involved in extraction of copper.

   (b) Briefly explain Aluminum alloys.

SECTION - V

9 (a) Describe the basic principles on which heat treatment of steel is based.

   (b) Describe the Spheroidal annealing and Isothermal annealing.

10 (a) Explain the need of surface hardening.

    (b) Describe the principle of flame hardening and induction hardening.

SECTION - VI

11 (a) Explain important steps involved in the production of components by powder metallurgy technique.

    (b) Discuss the advantages and limitations of powder metallurgy.

12 Explain the super alloys and smart materials clearly.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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
* * *

SECTION - I

1   (a)   A medium Characterized by $\sigma=0$, $\mu=2\mu_0$ and $\varepsilon=5\varepsilon_0$. If $\mathbf{H}= 2\cos(\omega t-3y)\mathbf{a}_z$ A/m, Calculate ω and $\mathbf{E}$

    (b)   Express Maxwell Equation in Differential form.

2   (a)   Derive Lorenz Equation for time varying Potentials.

    (b)   In a linear homogeneous and isotropic conductor, show that the charge density ρ_v satisfies

$$\frac{\partial \rho_v}{\partial t} + \frac{\sigma}{\varepsilon}\rho_v = 0$$

SECTION - II

3   (a)   Derive equations for uniform plane wave in lossless media

    (b)   In a lossless medium for which $\eta=60\pi$, $\mu_r=1$, and $\mathbf{H}= -0.2 \cos(\omega t-z)a_x+0.5 \sin(\omega t-z)a_y$ A/m, Calculate ε_r, ω and $\mathbf{E}$

4   The magnetic field component of a plane wave in a lossless dielectric is
$$\mathbf{H} = 30 \sin (2\pi \times 10^8 t - 5x)\, \mathbf{a}_z \text{ mA/m}$$
    (a) If $\mu_r = 1$, find ε_r.
    (b) Calculate the wave length and wave Velocity
    (c) Determine the wave impedance
    (d) Determine the polarization of the wave
    (e) Find the corresponding electric field component
    (f) Find the displacement Current Density

SECTION -III

5   (a)   Derive equation for good COnductors

    (b)   A plane wave in air with
$$\mathbf{E} = (8a_x + 6a_y + 5a_z) \sin (\omega t + 3x - 4y) \text{ V/m}$$

is incident on a copper slab in $y\geq0$. Find ω and the reflected wave. Assume copper is a perfect conductor

6   (a)   State and Explain Pointing theorem

    (b)   In a nonmagnetic material,

$$H = 30 \cos (2\pi \times 10^8 t - 6x) \, a_y \text{ mA/m}$$

find: (a) the intrinsic impedance, (b) the Poynting vector, (c) the time-average power crossing the surface $x = 1, 0 < y < 2, 0 < z < 3$ m.

SECTION - IV

7   (a)   Define polarization. Explain in detail about different types of polarization.

    (b)   A plane wave in air with

$$E = (8a_x + 6a_y + 5a_z) \sin (\omega t + 3x - 4y) \text{ V/m}$$

is incident on a copper slab in $y \geq 0$. Find ω and the reflected wave. Assume copper is a perfect conductor

8   (a)   Write in detail about the reflection of a plane wave at Oblique incidence

    (b)   Show that the field

$$E_s = 20 \sin (k_x x) \cos (k_y y) \, a_z$$

where $k_x^2 + k_y^2 = \omega^2 \mu_0 \varepsilon_0$, can be represented as the superposition of four propagating plane waves. Find the corresponding H_s.

SECTION - V

9   (a)   Derive transmission line equations and find condition for distortion less transmission

    (b)   A transmission line operating at 500 MHz has $Z_o = 80 \, \Omega$, $\alpha = 0.04$ Np/m, $\beta = 1.5$ rad/m. Find the line parameters $R, L, G,$ and C.

10   A lossless transmission line with a characteristic impedance of 75 Ω is terminated by a load of 120 Ω. The length of the line is 1.25λ. If the line is energized by a source o 100 V (rms) with an internal impedance of 50 Ω, determine: (a) the input impedance, and (b) the magnitude of the load voltage.

SECTION - VI

11   Explain in detail about smith chart and its applications.

12   A lossless 60-Ω line is terminated by a $60 + j60$-Ω load.

(a) Find Γ and s. If $Z_{in} = 120 - j60 \, \Omega$, how far (in terms of wavelengths) is the load from the generator? Solve this without using the Smith chart.

(b) Solve the problem in (a) using the Smith chart. Calculate Z_{max} and $Z_{in,min}$. How far (in terms of λ) is the first maximum voltage from the load?

R-17

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   Define the law of demand. What are its exceptions? Explain.

2   (a)   What is cross elasticity of demand?

     (b)   Briefly explain the concept of marginal utility analysis.

SECTION - II

3   (a)   Write a short note on Cobb-Douglas production function.

     (b)   What is meant by economies of scale?

4   What are the important assumptions of break even analysis? What are its applications? Explain.

SECTION - III

5   What are the various market structures? Explain each of them in detail.

6   (a)   What is meant by price discrimination?

     (b)   What is penetration pricing?

SECTION - IV

7   What are the various features of Joint Stock Company? Explain.

8   (a)   What are the important functions of commercial banks?

     (b)   Briefly explain the impact of technology on banking sector.

SECTION - V

9   What is journal? What are the items to be observed while passing the journal entries? Explain.

10   (a)   What is trading account? Why is it prepared?

      (b)   What are the differences between profit & loss account and balance sheet?

SECTION - VI

11   A firm is considering the following project

Cash flows in Rupees					
C_0	C_1	C_2	C_3	C_4	C_5
-50,000	+11,300	+12,769	+14,429	+16,305	+18,421

Calculate NPV of the project, if the cost of capital is 10 percent.

12   What are the factors that determine the working capital requirements of a business? Explain.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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
* * *

SECTION - I

1   (a)   Define modulation and Explain the need of modulation -

    (b)   Describe about AM modulation index

2   A modulating signal 10 sin (2π X 10^3t) is used to modulate a carrier signal 20 sin (2π X 10^4t).Determine the modulation index, percentage modulation, frequencies of the sideband components and their amplitudes. What will be the bandwidth of the modulated signal?

SECTION - II

3   Explain the phase shift method for SSB generation with its merits and demerits.

4   (a)   Why is SSB not used for broadcasting?

    (b)   Compare between the Sideband Suppression methods ∗

SECTION - III

5   (a)   Explain about the generation of DSB-SC signal by using balanced modulator.

    (b)   Explain about the Synchronous Detection method.

6   (a)   Explain about the generation of VSB.

    (b)   Explain about the Detection of VSB.

SECTION - IV

7   Explain about the types of FM generation.

8   (a)   Determine the practical bandwidth of a single tone WBFM

      (b)   Explain about PLL

SECTION - V

9   Discuss about various sources and types of noise.

10   Explain the noise performance of DSB-SC scheme with the help of neat block diagram.

SECTION - VI

11   Explain about TRF receiver with a neat block diagram and its drawbacks.

12   (a)   Explain about AM Broadcast Transmitters.

      (b)   Explain about AGC.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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)   State and prove Bayes theorem.

(b)   A biased coin with probability of obtaining a Head equal to $p > 0$ is tossed repeatedly and independently until the first head is observed. Compute the probability that the first head appears at an even numbered toss.

2   (a)   Explain the Bernoulli's trials with suitable examples.

(b)   There are three bags: first containing – 1white, 2 red, 3 green balls;2nd containing– 2white, 3red, 1green balls; 3rd containing–3white, 1red, 2green balls.Two balls are drawn from a bag chosen at random. These are found to be one white and one red. Find the probability that the balls so drawn came from the second bag.

SECTION - II

3   (a)   Define two functions of two random variables. Express the relationship between the two and explain the properties of two.

(b)   Write and plot probability density function and probability distribution function of the following random variables :
   (i)   Gaussian random variable
   (ii)   Exponential random variable
   (iii)   Binomial random variable
   (iv)   Rayleigh random variable

4   (a)   A random variable has a probability density
$$f_X(x) = \begin{cases} \dfrac{5}{4}\left(1 - x^4\right), & 0 < x \le 1 \\ 0, & elsewhere \end{cases}$$
Evaluate (i) E[X] (ii) E[4X+2] (iii) E[X²].

(b)   A random variable X has a probability density
$$f_X(x) = \begin{cases} \dfrac{\pi}{16}\cos\left(\dfrac{\pi x}{8}\right), & -4 < x < 4 \\ 0, & elsewhere \end{cases}$$
Find (a) Mean value (b) Second moment (c) Variance.

SECTION - III

5   (a)   Explain the joint characteristics function and its properties.

    (b)   Write the equation for Joint density function and prove its properties.

6   (a)   Let X and Y be the independent random variables each having density function
f(x) = 2 e-2a for a >0

         = 0 else where
Find: (i) E(X+Y), (ii) E(X2+Y2), (iii) E(XY)

    (b)   The joint probability density function of two random variable X and Y is

         $F(x,y) = Ae^{-(x+y)}$, x≥0,y≥0. Determine A ,f_x(x) and f_y(y) .

SECTION - IV

7   (a)   Explain the properties of power spectral density..

    (b)   Calculate the power spectral density of a stationary random process for which the
auto correlation is $Rxx(\tau) = \sigma^2 . e^{-\alpha|\tau|}$

8   (a)   Explain about stationary random process of first order and second order.

    (b)   Two random process X(t) & Y(t) are defined as X(t) = A Cos(ω_0t + θ), Y(t) = B Sin(ω_0t + θ)
where A, B, ω_0 are constants and θ is uniformly distributed random variable on the interval
(0, 2π). (i) Calculate $R_{XY}(t,t+\tau)$ (ii) Check X(t) , Y(t) are Jointly WSS or not.

SECTION - V

9   (a)   A Random Noise X(t) having power spectrum $S_{XX}(\omega)=\dfrac{3}{49+\omega^2}$ is applied to a
network for which $h(t)=u(t)t^2 \exp(-7t)$. The network response is denoted by Y(t).
(i)   Compute the average power in X(t)
(ii)   Evaluate the power spectrum of Y(t)
(iii)   Find the average power in Y(t)

    (b)   Derive the relationship between PSDs of input and output random processes of an
LTI system

10   (a)   If X(t) is WSS process, Develop the power spectrum of $Y(t)=A_0 +B_0X(t)$ in terms
of the power spectrum of X(t), if A₀, B₀ are real constants.

    (b)   A white noise PSD is $\dfrac{N_0}{2}$ is transmitted through linear system as shown in figure.
Estimate the output PSD and average power.
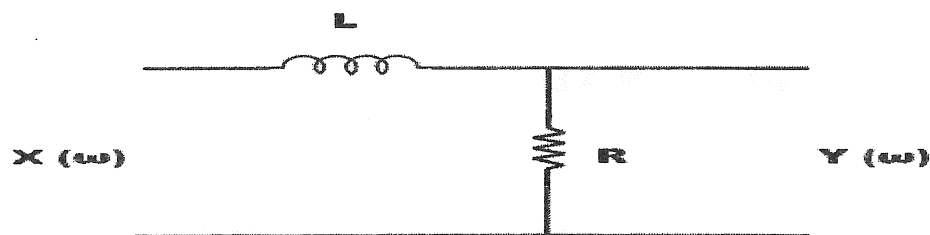
SECTION - VI

11   (a)   Derive an expression for the over all noise figure of cascaded system.

      (b)   An antenna is having noise temperature 300 k is connected to the input of receiver equivalent input noise temperature is 270^0k. The mid band available power Gain is 10^{20}. The noise bandwidth is 2.5MHz. Find out the available output noise power.

12   (a)   What is the concept of Matched filter for coloured and white noise?

      (b)   If the input to a linear time invariant system is white noise $\{N(t)\}$, what is power spectral density function of the output?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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)   Describe the following:
            (i) All Software Engineers Are Created Equal
            (ii) Tell Everyone the Truth All the Time

    (b)   Explain the following:
            (i) Review Everything & Test Everything
            (ii) Doing the Project Right Is Most Efficient

2   (a)   "A good vision and scope document will help a project avoid some of the costliest problems". Explain?

    (b)   How do you diagnose project planning problems?

SECTION - II

3   (a)   Write a short note on following estimation techniques:
            (i) PROBE
            (ii) COCOMO II
            (iii) The Planning Game

    (b)   Discuss about delphi process with the help of script.

4   What is project schedule? Explain in detail about Building the Project Schedule.

SECTION - III

5   (a)   Discuss the following:
            (i) Code reviews
            (ii) Desk checks

    (b)   How do you diagnose review problems?

6   (a)   What do you know about Software Requirements Specification?

    (b)   What is the use of change control? Explain about change control board (CCB).

SECTION - IV

7   (a)   What is the purpose of Version Control System? Discuss the role of subversion with example.

     (b)   Discuss the following

           (i) Review the Design   (ii) Unit Testing

8   (a)   Outline the usage of Software testing effectively in the development of software.

     (b)   Write a short on (i) Smoke Tests   (ii) Defect Tracking and Triage

SECTION - V

9   Explain in detail How to Make Change Succeed?

10   (a)   "Grant Authority and Accountability to Team Members". Express your views.

      (b)   Summarize the concept of Manage the Organization.

SECTION - VI

11   Briefly explain the Management issues of outsourced projects.

12   (a)   How the Life Without a Software Process. Justify your answer.

      (b)   Discuss about Moving forward.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
II B.Tech. II Semester
DATABASE MANAGEMENT SYSTEMS
(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. Define Data Independence. Explain the centralized architecture of DBMS with suitable diagram.

2. (a) What is an entity? Explain how the classification of DBMS's performed by using data models.

   (b) Design an ER model for the company schema with structural constraints.

SECTION - II

3. (a) What is an Entity Integrity Constraint? Explain various constraints on databases.

   (b) Briefly explain how to deal with various violations caused by delete operation.

4. Write queries to the following questions using Relation Algebra, Tuple Relational Calculus and Domain Relational Calculus.
   1. Retrieve the name and address of all employees who work for the 'Research' department.
   2. List the names of managers who have at least one dependent.

SECTION - III

5. What is polymorphism? Explain how to creating tables based on the User Defined Types (UDT) in SQL.

6. (a) Briefly Explain Nested and Correlated Nested queries with suitable examples.

   (b) Discuss how object database (ODB) design differs from relational database (RDB) design.

SECTION – IV

7. (a) Write the procedure to translating SQL queries into Relational Algebra.

   (b) Explain various methods for implementing Join operation in detail.

8. Define Functional Dependency. State Third and BCNF Normal Form with example.

SECTION – V

9. (a) What is Lock? Briefly discuss about multi version two phase locking using certify locks.

   (b) Explain optimistic concurrency control with suitable example.

10. (a) Define Checkpoint. Explain Write Ahead Logging (WAL) protocol in detail.

    (b) Discuss about Shadow Paging with suitable example.

SECTION - VI

11. (a) Describe common datatypes and models for storing spatial data.

    (b) Explain how to implement object recognition in images.

12. (a) What are various threats to databases? Explain four main control measures used to provide security of data in databases.

    (b) Distinguish between Discretionary Access Control and Mandatory Access Control.

II B.Tech. II Semester

DESIGN AND ANALYSIS OF ALGORITHMS
(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 general strategy of Divide and Conquer technique.

   (b) Discuss the quick sort algorithm with suitable example.

2 (a) Explain Space complexity and time complexity.

   (b) Explain the working principle of merge sort.

SECTION – II

3   What is Greedy method? Give an example.

4   Discuss Kruskals method for generating minimum cost spanning tree.

SECTION – III

5   Explain all pairs shortest path problem with an example.

6   Develop a dynamic programming solution for multistage graph problem.

SECTION – IV

7   Explain union and find operations on sets with a suitable example.

8   Explain DFS using an example.

SECTION – V

9   Explain *4-Queens* problem.

10 Explain Travelling salesperson problem using Branch and bound.

SECTION – VI

11 Explain clique with an example.

12 Distinguish between NP-Complete and NP-Hard Problems.

SECTION - IV

7 (a) Discuss & Explain about graphical notation of PDA.

   (b) Construct a PDA which accepts the language of word over alphabet $\Sigma = \{a, b\}$ containing $L = \{a^i b^j c^k | i, j, k \in N, i + k = j\}$

8 (a) Explain about Two stack PDA with example

   (b) Design Two Stack PDA that accepts the language $L = \{a^n b^n c^n | n > 0\}$

SECTION - V

9 (a) Design a Turing Machine that find the Subtraction of two numbers.

   (b) Design a TM that copies a given string over $\Sigma = \{a, b\}$

10 (a) Explain about Church's Thesis.

    (b) Design a Turing Machine for $L = \{ww^R | w \in \{a, b\}\}$

SECTION - VI

11 (a) Explain the design of Universal TM.

    (b) Prove "Language accepted by NFA is decidable"

12 (a) Write the definition of P, NP problems and NP complete & NP hard problems.

    (b) Discuss & explain about Modified Post Correspondence Problem.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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   (a)   Explain about different operations that we can perform on Strings.

     (b)   Discuss about DFA. Design a language that can accept set of all Strings over
            $\Sigma = \{a, b\}$ and end with aa.

2   (a)   State and prove equivalence between DFA and NFA.

     (b)   Construct a Mealy Machine to print out 1's complement of input bit string.

SECTION - II

3   (a)   Construct Regular Expression for the DFA
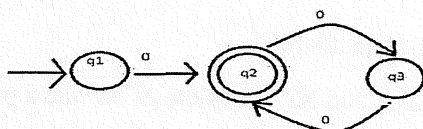
     (b)   Write a detail note on the closure properties of Regular sets.

4   (a)   Find right linear grammar for the DFA
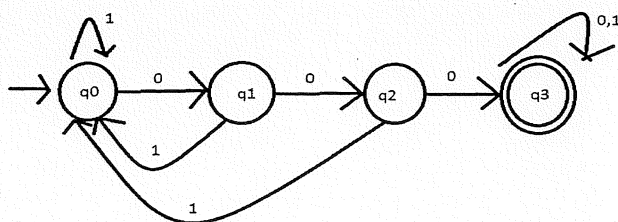
     (b)   Construct RG for the given Finite Automata $(a+b)^*aa(a+b)^*$

SECTION - III

5   (a)   Discuss about Chomsky Language Hierarchy.

     (b)   Discuss various steps in Signification of CFG? What is the need of such
            Signification?

6   (a)   Obtain CFG to generate a language of all non-palindrome over the alphabet
            $\Sigma = \{a, b\}$

     (b)   Bring the grammars G with V={S,A,B},T={a,b} and productions P

            S →AB ,

            A→BSB,

            A→a,

            B→b

            into Greibach Normal Form

SECTION - V

9 (a) Explain the services provided by transport layer to the upper layers.

   (b) Explain transport service primitives and connection release in transport layer.

10   What is a firewall? Explain in detail.

SECTION - VI

11 (a) Illustrate how bidirectional data transfer can take place in TCP?

    (b) Explain how TCP handles flow control.

12 (a) What is the purpose of Domain Name System? Explain.

    (b) Demonstrate the features of E-mail with suitable example.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021
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 basic network topologies and cite an advantage of each type.

   (b) Explain about network hardware and network software.

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) Elaborate different error detection techniques used in data link layer.

   (b) Given the data word 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 (a) Explain about spanning tree bridges, repeaters and hubs.
   (b) Explain about switches, routers and gateways.

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) What are the responsibilities of network layer?

   (b) Explain briefly different sets of actions required to build routing tables in link state routing.

8   Discuss the following:
        (i)   Broadcast Routing
        (ii) Multicast Routing.

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, SEPTEMBER 2021

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   Explain about language evaluation criteria in detail.

2   (a) Discuss various programming domains and their associated languages.

    (b) Describe the basic concept of denotational semantics.

SECTION - II

3   (a) What is type checking? Differntiate between static and dynamic type checking and give their relative advantages.

    (b) Explain about the mixed-mode assignments that are used in Ada and Java Languages.

4   (a) Define an array? Explain how to initialize an array? Explain the different types of arrays.

    (b) Explain about the control structures with an example.

SECTION – III

5   Explain the different parameter passing methods with an example.

6   (a) What are the characteristics of co-routine feature? List the languages which allow co-routines.

    (b) Explain about generic sub-programs with examples.

SECTION – IV

7   (a) What are the design issues of abstract data types.

    (b) Write a note on Abstract Data Types in Ruby.

8   How would you describe Encapsulation constructs?

SECTION – V

9   (a)   What is object oriented programming? Explain its concepts.

      (b)   Discuss the key concepts of scripting languages.

10   Explain how object oriented programming is support in java,c#,smalltalk.

SECTION – VI

11   (a)   Compare the functional programming languages with imperative languages.

      (b)   Explain the important functions of LISP.

12   (a)   Describe the two common mathematical functional forms that are provided by scheme.

      (b)   Explain about the fundamentals of functional programming languages.