CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Strength of Materials-I
(Civil Engineering)

Date: 24.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	State Hooke's law.	2 M
2.	What the difference is between gradually applied and suddenly applied loads?	2 M
3.	Define point of contra flexure.	2 M
4.	What is meant by the rate of loading at a specific section of a beam?	2 M
5.	List out the assumptions made in the theory of simple bending.	2 M
6.	Illustrate the concepts of bending stress and shear stress.	2 M
7.	How will you use double integration method for finding slope and deflection at any section of a given beam?	2 M
8.	Distinguish between a real beam and a conjugate beam.	2 M
9.	When σ_x = 50 MPa, σ_y= 100 MPa. Draw the Mohr's circle?	2 M
10.	What is maximum shear strain energy theory?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).   i) Draw stress – strain diagram for mild steel. Indicate salient points and define them.   5M
        ii) Derive the relationship between three elastic moduli.   5M

OR

11. B).   Three bars made of copper; Zinc and aluminum are of equal length and have diameters of 20 mm, 25mm and 25 mm respectively. They are rigidly connected at their ends. If the compound member is subjected to a longitudinal pull of 430 kN, estimate the stresses in each bar. Take E_c= 120 GPa, E_{zn}= 100GPa, E_{Al}= 90GPa.   10M

12. A).   A simply supported beam of span 10 m carries point loads 6 kN each at distance of 3 m and 5 m from left support and also a uniformly distributed load is 2 kN/m between the two point loads. Draw the shear force and bending moment diagrams for the beam.   10M

OR

12. B).   Draw the shear force and bending moment diagrams for the cantilever beam of span 5 m carries an uniformly distributed load of 4 kN/m over 2 m length from left end, a point load of 20 kN at 3 m from the left end and another point load of 10 kN at the free end of the cantilever.   10M

13. A).   Derive the pure bending equation M/I= f/Y= E/R.   10M

OR

13. B).   An I- section beam breadth 200 mm and depth 300 mm has a web thickness of 15mm and flange thickness of 20 mm. It carries a shearing force of 300 kN at a section. Calculate the maximum shear stress and draw the stress distribution diagram.   10M

(P.T.O..)

14. A). Derive the formulas for slope and deflection of a simply supported beam with a span of 'L' carrying a uniformly distributed load of 'w/m' over its entire length using Macaulay's method. 10M

OR

14. B). A simply supported beam of span 6 m loaded point load of 14 kN at its centre, in addition to the uniformly distributed load is 6 kN/m for whole span. Find slopes at the supports and maximum deflection by double integration method. 10M

15. A). A rectangular block is subjected to a tensile stress of σ_1= 150 N/mm² along X-axis and a tensile stress of σ_2= 75 N/mm² along Y- axis with a shear stress of 50 N/mm² on same planes determine. 10M
   i) Major Principal stress σ_{p1}
   ii) Major Principal stress σ_{p2}
   iii) Maximum shear stress q_{max}

OR

15. B). At point in a strained material the stresses are 100 MPa (tensile) and 60 MPa (compressive) accompanied by a shear stress of 40 MPa. Determine the principal stresses, Principal planes and maximum shear stresses at the point by Mohr's circle method. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025

Course Name: Fluid Mechanics

(Civil Engineering)

Date: 26.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	What are the uses of a manometer?	2 M
2.	What are the physical properties of fluids?	2 M
3.	Define path line and streak line.	2 M
4.	Define rotational flow	2 M
5.	Mention two differences between the Venturi meter and the orifice meter.	2 M
6.	What is a broad-crested weir?	2 M
7.	Who introduced the concept of boundary layer?	2 M
8.	Define drag and lift.	2 M
9.	Define Hydraulic Gradient Line (HGL).	2 M
10.	What is equivalent pipe?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	i) One liter of crude oil weighs 9.6 N. Calculate its specific weight, density and specific gravity.	5M
	ii) Explain about U-tube differential manometer.	5M
	OR	
11. B).	Derive the expression for pascals law.	10M
12. A).	Explain the classification of flows with examples.	10M
	OR	
12. B).	i) Water flows through a pipe of diameter 30 cm at a velocity of 4 m/s. Find the discharge. If the pipe contracts to 15 cm diameter, calculate the velocity in the smaller section assuming incompressible flow.	5M
	ii) A two-dimensional incompressible flow is given by the stream function $\psi = 6x - 6y$. Find the velocity components (u, v) and determine the velocity at point (2, 3).	5M
13. A).	Explain the principle and working of a Venturi meter with a neat sketch and derive the discharge equation.	10M
	OR	
13. B).	Derive an expression for Euler's equations for flow a log a streamline.	10M

(P.T.O..)

14. A). Explain types of boundary layers and discuss the characteristics of laminar, transition, and turbulent boundary layers. 10M

OR

14. B). A smooth flat plate 1.5 m long and 1 m wide is placed in water flowing at 2 m/s. Calculate the drag force and coefficient of drag assuming laminar flow over the entire plate. (Take $v = 1 \times 10^{-6}$ m^2/s, $\rho = 1000$ kg/m^3). 10M

15. A). i) Define and explain Hydraulic Gradient Line (HGL) and Total Energy Line (TEL). 5M
ii) Two pipes are connected in series between two reservoirs having a total head difference of 20 m. The first pipe is 500 m long and 0.30 m in diameter, and the second pipe is 300 m long and 0.20 m in diameter. The friction factor for both pipes is 0.02. Neglecting minor losses, determine the discharge (Q) through the pipeline system. Take $g = 9.81 m/s^2$. 5M

OR

15. B). Explain Reynolds' experiment with a neat sketch and discuss the different types of flow based on Reynolds number. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025

Course Name: Surveying & Geomatics
(Civil Engineering)

Date: 28.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Illustrate the principles of surveying.	2 M
2.	Explain the uses of chain.	2 M
3.	Define contour and contour interval.	2 M
4.	What is the purpose of leveling in surveying?	2 M
5.	Define volume of earthwork.	2 M
6.	What are the common errors in area and volume computation?	2 M
7.	What are the different adjustments of a theodolite?	2 M
8.	Define traversing and mention its applications.	2 M
9.	What is the tangent method in tacheometry?	2 M
10.	What are the elements of a simple circular curve?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Define Plane table surveying and explain any two methods of it.   10M

OR

11. B). Define Compass Surveying? Differentiate different types of compass.   10M

12. A). The following staff readings were observed successively with a level. The instrument has been shifted after third reading: 0.900; 1.100; 1.050; 1.450 and 1.550m. Enter the following readings in level book and Calculate the R.L of all points. Consider R.L of Bench Mark as 100.00m.   10M

OR

12. B). Discuss in details the characteristics and uses of contours.   10M

13. A). Explain the procedure for calculating areas from a planimeter and by coordinate method.   10M

OR

13. B). Describe the steps for determining the capacity of a reservoir and the volume of a barrow pit.   10M

14. A). Explain the measurement of horizontal angles using the method of repetition and reiteration.   10M

OR

14. B). Discuss the principle, construction, and working of an electronic theodolite.   10M

15. A). Derive the formulae for distance and elevation in tacheometric surveying when the line of sight is inclined.   10M

OR

15. B). Explain the design and setting out of compound curves in detail.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Building Construnction, Planning and Drawing
(Civil Engineering)

Date: 05.12.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   **10x2=20M**

1.	What is the significance of bonding in brick work?	2 M
2.	Write any two advantages of timber construction.	2 M
3.	Differentiate between paint and distemper.	2 M
4.	List out the different types of foundations.	2 M
5.	Define the terms Grouping and circulation.	2 M
6.	What do you understand by built up area?	2 M
7.	Draw sign convention for the following materials: i) Cast iron and ii) Glass.	2 M
8.	List out the various types of residential buildings.	2 M
9.	Write any four types of roofs.	2 M
10.	Indicate the situations where steel staircase is used.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A).   Discuss the qualities of good timber and the methods of seasoning timber.   10M

OR

11. B).   i) Draw plan and elevation of 1½ brick English bond for even courses.   5M
           ii) What suggestions do you propose for the improvement in construction to avoid decay   5M
           of timber?

12. A).   Describe the process of painting on new and old surfaces and list the precautions to be   10M
           taken.

OR

12. B).   i) Write in detail on the different types of varnishes and paints.   5M
           ii) What are the major types of foundations used in buildings? Explain their suitability.   5M

13. A).   i) What are the objectives of the building byelaws?   5M
           ii) If the wall or column under construction is near some other property, it will not be   5M
           possible to spread the footing to both the sides of wall or column. In such case which
           types of footing is used and draw the elevation of such footing.

OR

13. B).   Draw and explain the footing details for an RCC column.   10M

(P.T.O..)

14. A). i) Explain the terminology floor area ratio. 5M

   ii) Enumerate the requirements of different rooms and their grouping. 5M

<div align="center">OR</div>

14. B). Draw plan of a building which consists of two bedrooms, one kitchen, one drawing hall, 10M
one verandah, one dining room and toilets with standard dimensions. Provide thickness of
walls as 230 mm. Also, provide doors and windows at appropriate locations with standard
dimensions.

15. A). i) Explain the different forms of stairs. 5M

   ii) Explain the different features of Queen post truss. 5M

<div align="center">OR</div>

15. B). Explain the classification of roofs in detail. 10M

<div align="center">*****</div>

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025

Course Name: Network Theory-I

(Electrical & Electronics Engineering)

Date: 26.11.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.   **10x2=20M**

|		
1.	Explain Ohm's Law and summarize its limitations.	2 M
2.	Classify the different types of dependent sources and provide examples for each.	2 M
3.	Illustrate the Power Triangle and explain its significance in electrical engineering.	2 M
4.	Derive the expression for the admittance of an RC parallel circuit and define its components.	2 M
5.	Define the quality factor of RLC parallel circuit.	2 M
6.	Determine the maximum mutual inductance when two coils are magnetically coupled.	2 M
7.	Define the basic tree in graph theory and explain its significance in electrical networks.	2 M
8.	Define the node in a tree.	2 M
9.	State and explain Tellegen's Theorem.	2 M
10.	Analyze the limitations of the Reciprocity Theorem in electrical circuit applications.	2 M

PART-B

Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). Derive the expressions for equivalent resistances from star-delta transformation and delta-star transformation.   10M

OR

11. B). (i) Determine the loop currents for given network and find the power delivered from sources.   5M
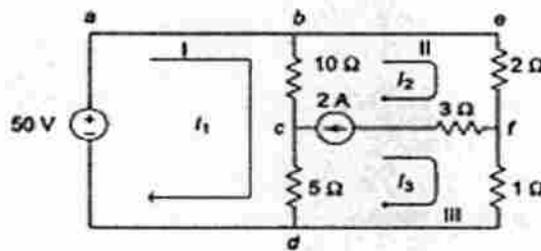
(ii) Describe the Kirchhoff's laws in detail.   5M

12. A). Find the average value and rms value for sinusoidal waveform.   10M

(P.T.O..)

12. B). (i). Given a series R-L circuit with R=10Ω and L=0.1 H, connected to a 50 Hz AC supply   5M
with V(t)=100cos(2π·50t), calculate the impedance of the circuit and the phase angle
between the voltage and current.

(ii). Find form factor for given waveform.   5M
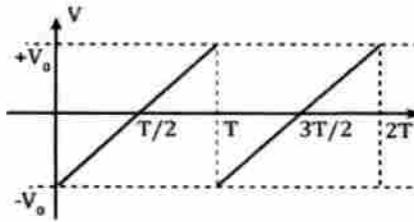
13. A). (i) Draw the locus of current of a series circuit consisting of resistance and capacitance   5M
with resistance varies and capacitance reactance fixed, when supplied by a constant ac
voltage source, lies on a circular path.

(ii) Determine the value of the Q at resonance and bandwidth of the circuit.   5M
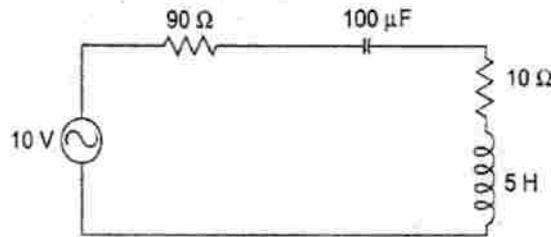
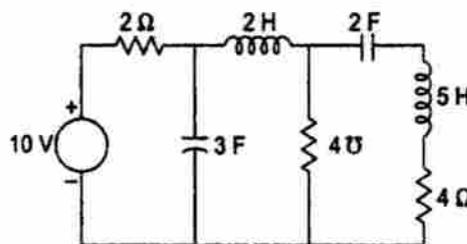OR

13. B). (i) Derive the quality factor for series RLC circuit.   5M

(ii) Derive the equation of equivalent inductance for two parallel coupled coils.   5M

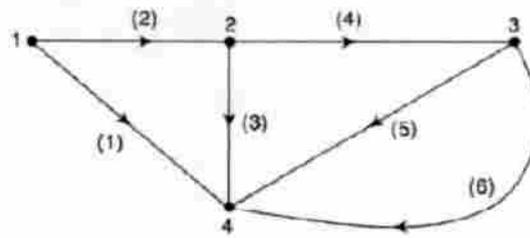14. A). (i) For the graph shown in figure obtain the tie-set matrix   5M
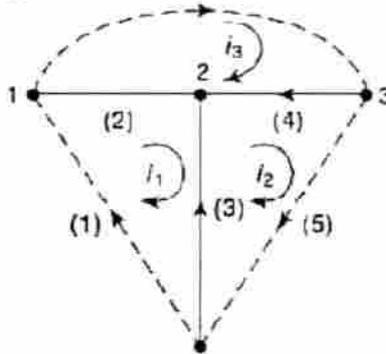
(ii) Construct the equivalent dual circuit for shown in figure.   5M

14. B). (i) Determine the incidence matrix for given network.   5M

(ii) Find the cut-set matrix for given graph.   5M
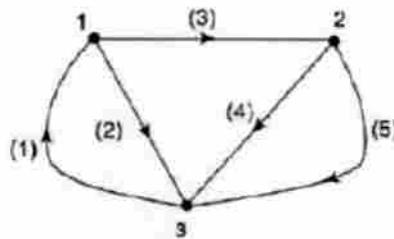
15. A). (i) Define the superposition theorem and find the voltage across the 2Ω resistor in figure   5M
by using super position theorem
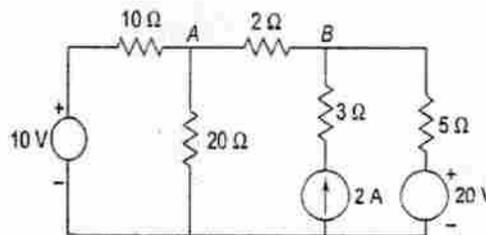
(ii) Describe the reciprocity theorem with one example.   5M

15. B). (i) State the Millman's theorem and draw the equivalent circuit of Millman's theorem.   5M
(ii) Find the Thevenin's equivalent circuit for given network.   5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Fluid Mecahnics & Hydraulic Machinery
(Electrical & Electronics Engineering)

Date: 01.12.2025 FN   Time: 3 hours   Max.Marks: 70

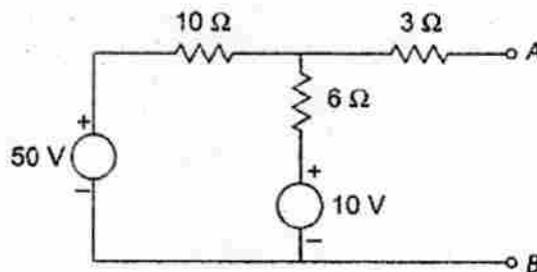**(Note: Assume suitable data if necessary)**
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Define specific gravity.	2 M
2.	Write a short note on vapor pressure.	2 M
3.	Distinguish between Orifice meter and venturi meter.	2 M
4.	Write continuity equation for one dimensional flow.	2 M
5.	Define boundary layer separation.	2 M
6.	Distinguish between drag and lift.	2 M
7.	List different types of Heads in hydraulic turbines.	2 M
8.	State the difference between turbine and pump.	2 M
9.	Give the classification of pumps.	2 M
10.	Write about NPSH.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Explain the phenomenon of surface tension on the top surface of liquids. Mention the   10M
examples of surface tension.

OR

11. B). A simple U– tube manometer containing mercury is connected to a pipe in which a fluid   10M
of specific gravity=0.8 and having vacuum pressure is flowing. The other end of the
manometer is open to atmosphere. Find the vacuum pressure in pipe, if the difference of
mercury level in the two limbs is 40cm. and the height of the fluid in the left tube from the
centre of pipe is 15cm below.

12. A). (i) Define Path Line, Streak line and streamline. For what type of flow these lines are   5M
identical.

(ii) Distinguish between rotational and irrotational fluids.   5M

OR

12. B). An Orifice meter consisting of 100 mm diameter orifice in a 250 mm diameter pipe has   10M
coefficient equal to 0.65. The pipe delivers oil (specific gravity = 0.8). The pressure
difference on the two sides of the orifice plate is measured by a mercury oil differential
manometer. If the differential gauge reads 80 mm of mercury, find the rate of flow.

13. A). Derive Darcy-weisbach equation from the fundamentals.   10M

OR

13. B). Explain the boundary layer characteristics along thin plate, bring out essential important   10M
points.

(P.T.O..)

14. A). A jet of 75 mm diameter strikes on a curved blade with an velocity of 10 m/s, the blade is moving at an 4 m/s and jet deflect at an angle of 165°. Determine: i) Force exerted in the direction of flow, ii) Work done by jet on blades.   10M

OR

14. B). Explain in detail the construction and working of a Francis turbine.   10M

15. A). With neat sketch, explain the principle of working of reciprocating pump.   10M

OR

15. B). A centrifugal pump is to discharge 0.118 m³/s at a speed of 1450 rpm against head of 25 m. The impeller diameter is 250 mm, its width at outlet is 50 mm and manometer efficiency is 75%. Determine the vane angle at the outer periphery of the impeller.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025

Course Name: Electrical Machines-I

(Electrical & Electronics Engineering)

Date: 05.12.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Define magnetomotive force (MMF).	2 M
2.	Define the term co-energy.	2 M
3.	Identify the functions of the commutator in a DC machine.	2 M
4.	State the significance of back emf.	2 M
5.	Define the term critical speed.	2 M
6.	List out the various speed control schemes of dc shunt motor.	2 M
7.	Justify the reason for expressing transformer ratings in kVA.	2 M
8.	List out the various types of transformer connections.	2 M
9.	Identify the applications of auto transformer.	2 M
10.	List any two methods used for cooling transformers.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Derive the expression for field energy produced in a doubly excited magnetic field system.   10M

OR

11. B). Explain the flux linkage vs current characteristics of a magnetic system. Also derive the expression for co energy density. Assume flux linkage vs current relationship of the magnetic circuit is linear.   10M

12. A). i) Explain the effect of armature reaction in a DC shunt generator.   5M
ii) A 6-pole lap wound dc generator rotated at 350 r.p.m. is required to generate 300V. the useful flux per pole is 0.05 Wb. If the armature has 120 slots. Calculate the number of conductors per slot.   5M

OR

12. B). Derive the expression for generated EMF in DC machine.   10M

13. A). Classify types of DC generators and illustrate with a neat diagram.   10M

OR

13. B). Describe the working of 3-point starter for DC shunt motor with neat diagram.   10M

14. A). Draw and explain the phasor diagram of a single-phase transformer on load.   10M

OR

14. B). i) Summarize the losses in transformers.   5M
ii) Derive the condition for maximum efficiency in a transformer.   5M

15. A). Explain in detail about Scott Connection and mention its applications.   10M

OR

15. B). Explain the working of auto transformer and prove that when transformation ratio approaches unity, the amount copper used approaches smaller value.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025

Course Name: Thermodynamics

(Mechanical Engineering)

Date: 26.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.   **10x2=20M**

1.	What do you understand by macroscopic and microscopic viewpoints?	2 M
2.	What is reversible process?	2 M
3.	What is a steady flow process?	2 M
4.	What is PMM 2? Why it is impossible?	2 M
5.	What do you understand by triple point?	2 M
6.	Define an ideal gas. What is universal gas constant?	2 M
7.	Define Dry bulb temperature and wet bulb temperature.	2 M
8.	Define mole fraction and mass fraction.	2 M
9.	Draw the P-V and T-S plots of Otto cycle.	2 M
10.	Define mean effective pressure?	2 M

PART-B

Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). Define a system? Classify the types of systems; explain the energy conversion in them.   10M

OR

11. B). Derive the expression for work done in i) Isothermal process ii) Polytropic process.   10M

12. A). Write the Kelvin-Planck and Clausius statement and explain with sketches.   10M

OR

12. B). A heat engine is operating between two reservoirs 1000K and 300K is used to drive a heat   10M
pump which extracts heat from the reservoir at 300K at a rate twice that at which the
engine rejects the heat to it. If the efficiency of the engine is 40% of the maximum
possible and COP of heat pump is 50% of the maximum possible, then determine the
temperature of the reservoir to which the heat pump rejects heat. Also determine the rate
of heat rejection from the heat pump, if the rate of heat supply to the heat engine is
50kW?

13. A). Write short notes on "Mollier diagram". Why do isobars on the Mollier diagram diverge   10M
from one another?

OR

13. B). Steam initially at 1.5MPa, 300^0C, expands reversibly and adiabatically in a steam turbine   10M
to 40^0C. Determine the ideal work output of the Turbine per kg of steam?

(P.T.O..)

14. A). Explain and Compare the Volumetric and Gravimetric Analysis of mixtures. 10M

OR

14. B). Air at 20^0C, 40% RH is mixed adiabatically with air at 40^0C, 40% RH in the ratio of 1 kg 10M
of former with 2 kg of the later (on dry basis). Find the final condition of air.

15. A). An engine with 200mm cylinder diameter and 300mm stroke working on theoretical 10M
diesel cycle. The initial pressure and temperature of air used are 1bar and 27^0C. The cut of
is 8% of the stroke. Determine air standard efficiency, mean effective pressure and power
of the engine if the working cycles per minute are 300? Assume the compression ratio is
15 and the working fluid is air.

OR

15. B). Explain the working principle of Bell-Coleman cycle with diagram. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Mechanics of Solids
(Mechanical Engineering)

Date: 28.11.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Define the terms: Principal planes and Principal Stresses.	2 M
2.	State the principle of superposition.	2 M
3.	What are the sign conventions for shear force and bending moment in general?	2 M
4.	What assumptions are made in theory of bending?	2 M
5.	What are some common methods used to calculate beam deflection?	2 M
6.	What factors primarily influence the magnitude of beam deflection?	2 M
7.	What type of stresses induced in shafts?	2 M
8.	Define the terms: Torsion and Torsional rigidity.	2 M
9.	Define thin cylinders and what type of stresses are induced in the cylinders.	2 M
10.	What do you mean by Lame's equation?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). A mild steel rod of 20mm diameter and 300mm long is enclosed centrally inside a hollow copper tube of external diameter 30mm and internal diameter 25mm. The ends of the tube and rods are brazed together, and the composite bar is subjected to an axial pull of 40KN. If Youngs modulus (E) for steel and copper is 200 GN/m^2 and 100 GN/m^2 respectively, Calculate the stresses developed in the rod and tube. Also find extension of the rod.   10M

OR

11. B). The following results were obtained in a tensile test of mild steel specimen of original diameter 20 mm and a gauge length of 40 mm at the limit of proportionality the load was 80 KN and the extension was 0.048 mm. The specimen yielded at a load of 85 KN and the maximum load withstood was 150 KN. When the two broken parts were fitted together the length of the gauge markings was found to be 55.6 mm and the minimum diameter at the neck was 15.8 mm, calculate modulus of elasticity, stress at limit of proportionality, yield stress, ultimate stress, % of elongation, % of reduction in area.   10M

12. A). A simply supported beam of span 10 m carries an UDL of 10 KN/m over a length of 3 m from left support and also from right support. Construct shear force diagram and Bending Movement diagram.   10M

OR

12. B). Prove the relation $\frac{\sigma}{y} = \frac{M}{I} = \frac{E}{R}$ for simple bending.   10M

13. A). Derive an expression for the slope and deflection of the simply supported beam carrying a point load at the centre.   10M

(P.T.O..)

13. B). A beam ABC of length 9 m has one support of the left end and the other support at a   10M
distance of 6 m from the left end. The beam carries a point load of 1 KN at right end and
also carries a UDL of 4 KN/m over a length of 3 m is started at 3 m from the left support.
Determine slope and deflection at point 'C'.
Take $E = 2 \times 10^5$ N/mm^2 and $I = 5 \times 10^8$ mm^4.

14. A). Two shafts of the same material and of same lengths are subjected to the same torque, if   10M
the first shaft is of a solid circular section and the second shaft is of hollow circular
section, whose internal diameter is 2/3 of the outside diameter and the maximum shear
stress developed in each shaft is the same, compare the weights of the shafts.

14. B). i) A shaft is transmitting 97.5 KW at 180 r.p.m. If the allowable shear stress in the   5M
material is 60 MPa, choose the suitable diameter for the shaft. The shaft is not to twist
exceed more than 1^0 in a length of 3 meters. Take Modulus of rigidity G= 80GPa.

     ii) A closely coiled helical spring of 10cm mean diameter is made up of 1 cm diameter   5M
rod and has 20 turns. The spring carries an axial load of 200N. Determine the shear stress.
Taking the value of modulus of rigidity = 8.4×10^4 N/mm^2, determine the deflection when
carrying this load. Also calculate the stiffness of the spring.

15. A). Derive the relation for the change of diameter and change in length and change in volume   10M
of a thin cylindrical shell subjected to an internal pressure.

15. B). A cast iron pipe of 400mm internal diameter and 100 mm thickness carries water under a   10M
pressure of 8 N/mm^2. Determine the maximum and minimum intensities of hoop stress
across the section. Also sketch the radial pressure distribution and hoop stress distribution
across the section.

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Electrical Engineering
(Electronics & Communication Engineering)

Date: 26.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
### Each question carries TWO marks.   10x2=20M

1.	What do you meant by source transformation in electrical circuits?	2 M
2.	What is the condition for maximum power transfer in an electrical network?	2 M
3.	For $v = 141.4\sin(314t)$, find the RMS value of voltage.	2 M
4.	What do you meant by the term phase sequence?	2 M
5.	What is meant by a transient response in an electric circuit?	2 M
6.	What are the different types of singularity function?	2 M
7.	Define voltage regulation of a transformer.	2 M
8.	Draw the phasor diagram of a single phase transformer on load.	2 M
9.	How to reduce the losses in a DC machine?	2 M
10.	What is the condition for maximum power in a DC motor?	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

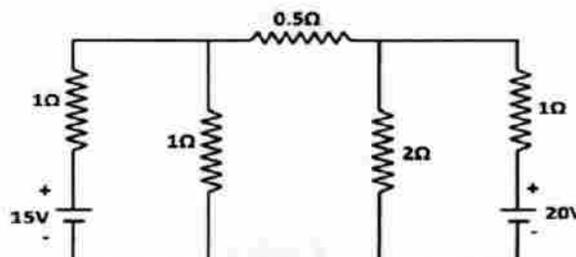11.A).   i) State Superposition Theorem and calculate the current flowing through the 6Ω resistor   6M
by using superposition theorem.
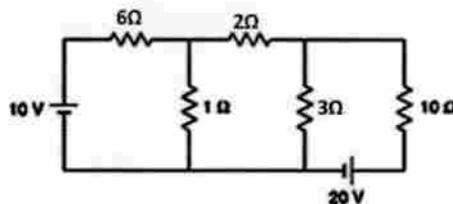
ii) Illustrate KCL and KVL with suitable examples.   4M

OR

11. B).   i) State and explain Thevenin's Theorem with an example.   5M

ii) Find the current through each resistor of the circuit shown in the Figure using nodal   5M
analysis.

(P.T.O..)

12. A). Find the resonance frequency for a series RLC circuit. Write the expression of Q-factor, upper-lower frequency and bandwidth. Calculate the quality factor and half-power frequency of a series resonant circuit where the resonance frequency is 200 kHz and BW=50 kHz.   10M

OR

12. B). Derive the Average and RMS value of a full-rectified voltage wave.   10M

13. A). i) The switch in the circuit shown in the figure has been closed for a long time. At t = 0, the switch is opened. Calculate i (t) for t > 0.   6M
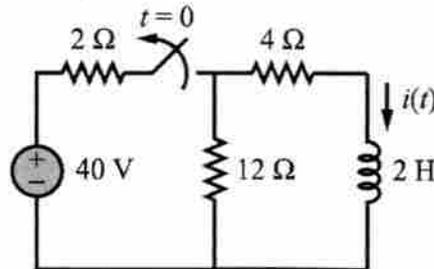
ii) Explain a unit ramp function with a neat illustration.   4M

OR

13. B). i) The switch in the circuit in the figure has been closed for a long time, and it is opened at t = 0. Calculate v (t) for t > 0.   6M
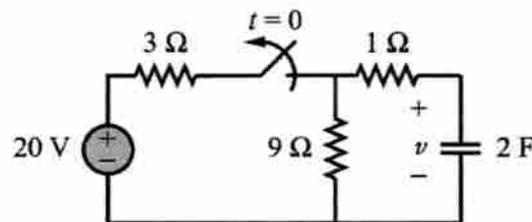
ii) Explain a unit impulse function with a neat illustration.   4M

14. A). With neat diagrams explain the principle, construction and operation of a Single phase transformer.   10M

OR

14. B). Develop an equivalent circuit of a single phase transformer referred to primary and explain the parameters involved.   10M

15. A). i) Derive an expression for the torque equation of a DC motor. Also briefly explain the significance of back emf.   7M

ii) Calculate the flux per pole required for a 4 –pole generator with 360 conductors generating 250V at 1000rpm, when armature is a) lap wound   b) wave wound.   3M

OR

15. B). i) Explain the construction of a DC machine with a neat sketch.   5M

ii) With neat diagrams explain the different types of DC generators.   5M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Probability & Stochastic Processes
(Electronics & Communication Engineering)

Date: 28.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   **10x2=20M**

1.	List of the Axioms of Probability.	2 M
2.	Explain Conditional Probability of events A and B.	2 M
3.	Define Expected Value of a Random Variable.	2 M
4.	Define variance and skew.	2 M
5.	Write two properties of joint density function of random variables.	2 M
6.	Define Joint Characteristic Function.	2 M
7.	Define Ergodicity.	2 M
8.	Define WSS.	2 M
9.	Write the expression for power spectral density.	2 M
10.	State any 2 properties of cross-power density spectrum.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A).   i) In a single throw of two dice, what is the probability of obtaining a sum of at least 10.   5M
ii) List out Conditions for a function to be a Random Variable.   5M

OR

11. B).   i) State and Prove Bayes Theorem.   5M
ii) A single card is drawn at random from a standard deck of 52 playing cards. What is the Probability of getting a ace card?   5M

12. A).   A random variable X has probability density function: 10M

$$f_X(x) = 5e^{-5x} \quad 0 \le x \le \infty$$
$$= 0 \qquad \text{else where}$$

Find   i) $E(X)$ ii) $E[(X-1)^2]$.

OR

12. B).   i) Find the mean and variance of a binomial distribution function.   5M
ii) List out the Properties of Probability Distribution.   5M

13. A).   i) Explain about Joint Moments about the Origin.   5M
ii) State and prove any three properties of joint characteristic function.   5M

OR

13. B).   The joint probability density function of random variables X and Y is   10M
$f(x,y) = 16xy, \ 0 < x < 2, \ 0 < y < 3$
Find (i) find marginal density functions. (ii) Find conditional density functions. (iii) Are X and Y statistically independent?

(P.T.O..)

14. A). Define Cross correlation function of a random process. Write properties of Cross correlation function and prove any three of them.   10M

<div align="center">OR</div>

14. B). A random process is defined as $X(t) = A \cos(\omega_o t + \Theta)$, where Θ is a uniformly distributed random variable in the interval $(0, \pi/2)$.   10M

Check for its wide sense stationarity? A and ω_o are constants.

15. A). i) Find the PSD of a stationary random process for which auto correlation is $Rxx(\tau) = 6e^{-a|\tau|}$.   5M

ii) State and prove any 2 properties of cross power spectral density.   5M

<div align="center">OR</div>

15. B). State and prove the properties of power spectral density.   10M

<div align="center">*****</div>

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Switching Theory & Logic Design
(Electronics & Communication Engineering)

Date: 01.12.2025 FN | Time: 3 hours | Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1. Write the Excess-3 code for $(25)_{10}$.   2 M
2. State the principle of duality in Boolean algebra.   2 M
3. Define prime implicant and essential prime implicant.   2 M
4. Design a 4:1 multiplexer using logic gates.   2 M
5. Differentiate between latch and flip-flop.   2 M
6. Write the truth table of an SR latch using NAND gates.   2 M
7. Differentiate between Moore and Mealy machines.   2 M
8. Define a sequence generator.   2 M
9. What is a merger graph?   2 M
10. Discuss about weighing machine in ASM design context.   2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Discuss 1's and 2's complement methods for subtraction of binary numbers with examples.   10M

OR

11. B). Simplify the following Boolean functions to minimum number of literals.   10M
i) F=xy+x'z+yz   ii) F=x'y'z+x'yz+xy'   iii) F= (x+y)'(x'+y')   iv) F=xy+xy'+x'y

12. A). Simplify the Boolean function $F(A, B, C, D) = \Sigma(0,1,2,5,8,9,10,13)$ using Karnaugh Map and realize using NAND gates.   10M

OR

12. B). What is decoder? Construct a 4×16 decoder with two 3×8 decoders.   10M

13. A). Draw the schematic circuit of a D flip flop with negative edge triggering using NAND gates. Give its truth table and explain its operation?   10M

OR

13. B). Write the conversion procedure of the flip-flops. Convert T flip-flop to JK flipflop.   10M

14. A). List and explain the design steps used to construct a sequential circuit using flip-flops.   10M

OR

14. B). Describe the operation of serial-in serial-out and parallel-in parallel-out shift registers with neat diagrams.   10M

15. A). Explain the minimization of incompletely specified sequential machines using merger graph method.   10M

OR

15. B). Compare and contrast FSM and ASM chart representations.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Electronic Devices & Circuits
(Common for EEE & ECE)

Date: 03.12.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Draw the ideal diode model for forward and reverse bias.	2 M
2.	Write a note on the working principle of Photo diode.	2 M
3.	Define ripple factor. How to find the ripple factor of a full wave rectifier?	2 M
4.	How P-N junction diode acts as a Rectifier?	2 M
5.	Compare CE, CC and CB configurations.	2 M
6.	Define beta in DC mode of a transistor.	2 M
7.	Write a note on bias compensation using diodes	2 M
8.	The operating point of a Class B amplifier is located at which portion in the load line. What is its maximum efficiency?	2 M
9.	Mention three different regions of operation of MOSFET. In which region MOSFET acts as resistor?	2 M
10.	Draw the characteristics of I_D vs V_{DS} for a JFET when $V_{GS}=0$.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Derive the mathematical expression for the current flowing through a p–n junction diode.	10M

OR

11. B).	Define static and dynamic resistance of a junction diode. Derive an expression for dynamic resistance.	10M

12. A).	A full-wave bridge rectifier with a 120-Vrms sinusoidal input has a load resistor of 1 kΩ.	10M
	(i). If silicon diodes are employed, what is the dc voltage available at the load?	
	(ii). Determine the required PIV rating of each diode.	
	(iii). Find the maximum current through each diode during conduction.	

OR

12. B).	Draw and explain the working of Zener as a voltage regulator.	10M

13. A).	Derive the expressions for the ripple factor and efficiency of a half-wave rectifier.	10M

(P.T.O..)

13. B). A transistor with $h_{ie} = 1.1\ K\Omega$, $h_{fe} = 50$, $h_{re} = 2.5 \times 10^{-4}$, $h_{oe} = 25\mu\frac{A}{V}$ is connected in   10M
C.E. configuration given in Figure 1. Calculate: $A_i = \frac{I_o}{I_i}$, $A_{is} = \frac{I_o}{I_s}$, A_v, A_{vs}, R_i and R_o.
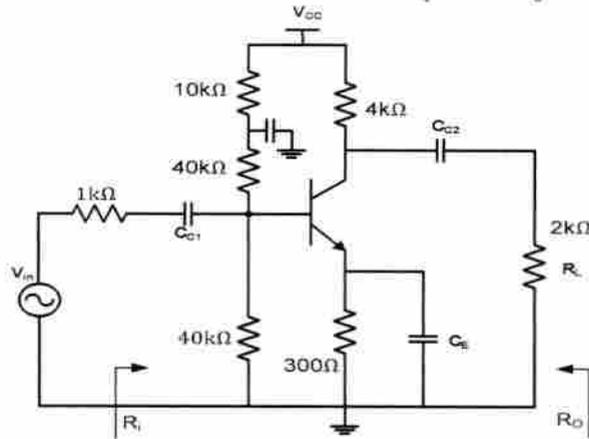
Figure 1

14. A). For the amplifier shown in the Figure 2. Assume $h_{ie} = 1\ K\Omega$ and $h_{fe} = 100$ Also   10M
$h_{oe} = h_{re} = 0$. Find A_v, A_{vs}, R_i and R_o . Assume all capacitors to be short circuit.
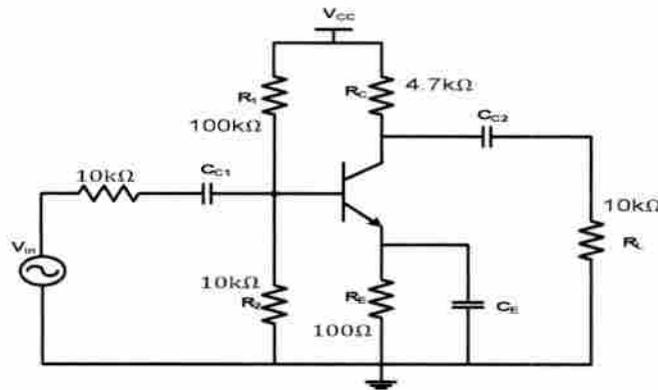
Figure 2

OR

14. B). Derive an expression for the stability factor of a self-bias circuit.   10M

15. A). i) Construct and explain the working principle of JFET for N-channel.   5M
ii) Draw the transfer and drain characteristics of Junction Field Effect Transistor.   5M

OR

15. B). Given I_{DSS}= 16mA and V_P= -5 V, sketch the transfer characteristics using the data points   10M
of Table shown below. Determine the value of I_D at V_{GS}= -3 V from the curve and
compare it to the value determined using Shockley's equation. Repeat the above for

V_{GS}= -1V.

V_{GS}(V)	I_D(mA)
0	I_{DSS}
$0.3V_P$	I_{DSS}/2
$0.5V_P$	I_{DSS}/4
V_P	0

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025

Course Name: Discrete Mathematics

(Common for CSE, IT, CSC & CSM)

Date: 24.11.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1. Construct the truth tables of the following compound propositions $\neg p \vee (\neg q \to r)$ 2 M
2. Write the symbolic form of the proposition "All real numbers are complex numbers"   2 M
3. State the Binomial theorem.   2 M
4. Find the value of n if $P(n, 2) = 90$.   2 M
5. Define Contradiction and Contingency with an example.   2 M
6. Prove that $(p \uparrow q) \equiv \sim(p \wedge q)$.   2 M
7. Define Homomorphism.   2 M
8. How many different strings of length 4 can be formed using the letters of the word "GENIOUS"   2 M
9. Define Bipartite graph with an example.   2 M
10. Define Chromatic Number of a graph with example.   2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Define Partial order relation prove that a relation R is partial order relation defined on A={1,2,3,4,6,12,18} with a relation ≤ .   10M

OR

11. B). State and prove power set theorem with an example.   10M

12. A). i) Prove that in any set of 29 persons at least five persons must have born on the same day of the week.   5M

ii) Prove that if 30 dictionaries in a library contain a total of 61,327 pages, then at least one of the dictionaries must have at least 2045 pages.   5M

OR

12. B). A survey of 500 television viewers of a sports chanel produced the following information, 285 watch cricket, 195 watch hockey, 115 watch football, 45 watch cricket and football,70 watch cricket and hockey, 50 watch hockey and football and 50 do not watch any of the three kinds of games.   10M
i) How many viewers in the survey watch all three kinds of games?
ii) How many viewers watch exactly one of the sports?

13. A). Prove that, for any propositions p, q, r the compound proposition $\sim(q \to r) \wedge r \wedge (p \to q)$ is a contradiction   10M

OR

13. B). Prove that for any propositions p, q, r the compound proposition $[(p \to q) \vee (p \to r)] \leftrightarrow [p \to (q \vee r)]$ is a tautology.   10M

(P.T.O..)

14. A). i) How many different strings of length 4 can be formed using the letter of the word FLOWER?   5M

ii) Find the number of permutations of the letters of the word SUCCESS.   5M

OR

14. B). i) Find the Coefficient of $x^3 y^3 z^2$ in the expansion of $(2x - 3y + 5z)^8$ 5M

ii) Find the number of non-negative integer solutions of the equation   5M

$$x_1 + x_2 + x_3 + x_4 + x_5 = 8.$$

15. A). By using Kruskal's Algorithm find the Minimal Spanning Tree for a Weighted graph.   10M
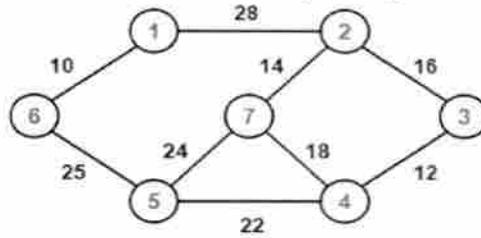
OR

15. B). By using Kruskal's Algorithm find the Minimal Spanning Tree for a Weighted graph.   10M
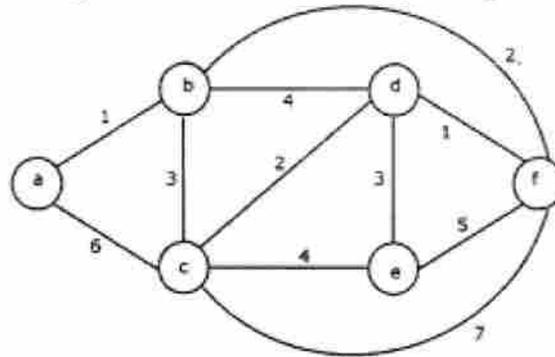
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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Analog & Digital Electronics
(Common for CSE & IT)

Date: 26.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries TWO marks.   10x2=20M

1.	Define rectifier.	2 M
2.	Draw the characteristics of Zener Diode.	2 M
3.	What is the need for biasing?	2 M
4.	How the UJT acts as a Relaxation Oscillator?	2 M
5.	Draw the characteristics of N-channel Depletion type MOSFET.	2 M
6.	Give the properties of Binary codes.	2 M
7.	Define Multiplexer.	2 M
8.	Write the truth table for EX-OR gate.	2 M
9.	Write the characteristic Equation of JK Flip-flop.	2 M
10.	Define Latch.	2 M

PART-B

Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Draw the band structure of open circuit PN-Junction and the expressions for contact difference of potentials.   10M

OR

11.B). With the help of Circuit and wave form explain the working of Half wave and full wave rectifiers and derive the expressions for form factor and ripple factor and efficiency?   10M

12.A). Demonstrate the input and output configurations of BJT in common base configuration.   10M

OR

12.B). Explain in detail about the working principle and operation of UJT.   10M

13.A). Describe the construction and working of Enhancement type and depletion type MOSFET.   10M

OR

13.B). List the properties of Boolean Function and explain.   10M

14.A). Implement the following using NAND NAND logic
(i) AB+D(C+AB)+CD (ii) (X+Y)+(Y+Z)   10M

OR

14.B). With a neat sketches explain the operation of Comparator circuits.   10M

15.A). Design a counter with the following repeated binary sequence 0,1,2,3,4,5,6 using JK Flipflop.   10M

OR

15.B). Convert a SR Flip-flop to a T-Flip-flop.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Computer Organization & Architecture
(Common for CSE, IT, CSC, CSM, AID & AIM)

Date: 28.11.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	What are the functional units of a computer?	2 M
2.	Define life cycle of instruction.	2 M
3.	Draw the flowchart for multiplication operation.	2 M
4.	Discuss about ripple carry adder.	2 M
5.	Define interrupt transfer.	2 M
6.	Explain the software interrupts and exceptions.	2 M
7.	Brief about Instruction pipeline.	2 M
8.	What are conditions for incoherence?	2 M
9.	Define Cache Memory and its use.	2 M
10.	Differentiate cache size and block size.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).	Discuss about Computer Instructions and draw the basic computer instruction formats.	10M
	OR	
11. B).	With the help of a block diagram, explain how do we select the address of control memory.	10M
12. A).	Explain the floating point addition- subtraction unit with an example.	10M
	OR	
12. B).	Derive an algorithm in flowchart form for the non-restoring method of fixed-point binary division.	10M
13. A).	Explain the Input-Output Processor (IOP) in detail.	10M
	OR	
13. B).	Briefly explain about hardwired control in detail.	10M
14. A).	What is pipelining? Discuss instruction pipelining using an example.	10M
	OR	
14. B).	How parallel processing is achieved in pipelining? Explain.	10M
15. A).	Explain the memory hierarchy in computer system with neat block diagram.	10M
	OR	
15. B).	Explain the mapping functions with the help of an example.	10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Object Oriented Programming
(Common for CSE & IT)

Date: 01.12.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Why is Java said to be robust?	2 M
2.	What is java Byte code?	2 M
3.	Define Unchecked exception.	2 M
4.	What is the purpose of the inner class?	2 M
5.	Define multithreading.	2 M
6.	Compare Byte streams and character streams.	2 M
7.	How can we tokenize the string in Java?	2 M
8.	What is meant by generic class?	2 M
9.	List any two features of Swing.	2 M
10.	Write a java program to demonstrate AWT button class.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) What is polymorphism? Explain different types of polymorphisms with examples. 5M

ii) Develop a Java Program to find the reverse of a given number and check whether it is palindrome or not. 5M

OR

11. B). i) Elaborate the procedure to create a package with multiple public classes. 5M

ii) Write a Java program to import user defined packages to perform arithmetic operations. 5M

12. A). i) Describe the usage of try-catch-finally in Exception handling mechanism. 5M

ii) Design a program to create a user exception and then handle that exception in other program. 5M

OR

12. B). Explain the four main types of inner classes in Java with suitable example. 10M

13. A). Elaborate in detail different ways of creating a thread using java. 10M

OR

13. B). i) With an example, demonstrate the concept of thread synchronization. 5M

ii) Design a multithreaded Java program that generates even and odd numbers from 1 to 25 using two separate threads. 5M

(P.T.O..)

14. A). What is Java Collections Framework? Explain Array List and Vector with an example 10M
program.

OR

14. B). Explain the various steps for connecting the database using JDBC API using a sample 10M
program.

15. A). Discuss the mouse event handling mechanism in Java using the Delegation Event Model. 10M

OR

15. B). Explain in detail any two layout managers with an example program. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Database Management Systems
(Common for CSE, IT, CSC, CSD & AID)

Date: 03.12.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Define Domain, Degree and cardinality.	2 M
2.	Compare Database Systems with File Systems.	2 M
3.	Distinguish between nested query and correlated nested query.	2 M
4.	Define integrity constraints Primary Key, Not NULL, Check with example.	2 M
5.	Summarize the Concept of Super Key.	2 M
6.	List the properties of Decomposition.	2 M
7.	What are two pitfalls of lock based protocol.	2 M
8.	What is Shadow Copy Scheme?	2 M
9.	What is the Difference between Dense and Sparse Index.	2 M
10.	Define Tree base Indexing.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). With a neat diagram describe the overall system structure of DBMS.   10M

OR

11. B). Explain E-R Notations used in database schema with examples.   10M

12. A). Explain in detail about various key constraints used in database system.   10M

OR

12. B). Consider the following schema: 10M
Suppliers(sid: integer, sname: string, address: string)
Parts(pid: integer, pname: string, color: string)
Catalog(sid: integer, pid: integer, cost: real)
The Catalog relation lists the prices charged for parts by Suppliers.
Write the following queries in SQL:
Find the pnames of parts for which there is some supplier.
Find the snames of suppliers who supply every part.
Find the snames of suppliers who supply every red part.
Find the pnames of parts supplied by Acme Widget Suppliers and no one else.

13. A). Explain briefly about 3NF, 4NF and BCNF with suitable examples?   10M

OR

13. B). Describe in detail about Relational Algebra with examples.   10M

(P.T.O..)

14. A). How is concurrency performed? Explain the protocol that is used to maintain the concurrency concept. 10M

OR

14. B). Explain Concurrency control with locking methods. 10M

15. A). Determine whether B+ tree is multi-level indexing? How does it differ from B-tree? 10M

OR

15. B). Illustrate about static and dynamic hashing in file organization. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Numerical Techniques & Probability Distributions
(Common for CSM, AID & AIM)

Date: 26.11.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1. Define Algebraic and Transcendental equations.   2 M
2. Construct a Forward difference table from the data.   2 M

x	0	1	2
$f(x)$	1	3	7

3. State the Simpson's rule.   2 M
4. Write the Runge –Kutta fourth order formula.   2 M
5. Find $L\{e^{2t} + 4t^3 - 2\sin 3t\}$.   2 M
6. Find $L^{-1}\left\{\frac{2s-5}{(s^2-9)}\right\}$.   2 M
7. For continuous random variable X whose probability function is given by $f(x) = k(1-x^2)$ for $0 < x < 1$ and $f(x) = 0$ otherwise then find k.   2 M
8. State the binomial distribution and give its constants.   2 M
9. Define Type –I and Type –II errors.   2 M
10. Write the main use of χ^2 test.   2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A).   i) Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of regula-falsi method correct to three decimal places.   5M

     ii) Using Newton's iterative method, find the real root of $3x = \cos x + 1$ 5M

OR

11. B).   From the following table, estimate the number of students who obtained marks between 40 and 45   10M

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

12. A).   Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule, Simpson's $\frac{1}{3}$ rule and Simpson's $\frac{3}{8}$ rule.   10M

OR

12. B).   Using modified Euler's method, find an approximate value of y when x = 0.3, given that $\frac{dy}{dx} = x + y$ and y = 1 when x = 0.   10M

(P.T.O..)

13. A). i) Find $L\{e^{4t}\sin 2t \cos t\}$ 5M

       ii) Find $L\left\{\frac{1-e^t}{t}\right\}$ 5M

<div align="center">OR</div>

13. B). Apply Convolution theorem to evaluate $L^{-1}\left\{\frac{1}{(s^2+1)\ (s^2+9)}\right\}$ 10M

14. A). A random variable X has the following probability function: 10M

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

Determine: (i) the value of K   (ii) $P(X < 6)$, $P(X \geq 6)$, $P(0 < X < 5)$ (iii) Mean

(iv) Variance   (v) Standard deviation (vi) if $P(X \leq m) > \frac{1}{2}$, find the minimum value of m.

<div align="center">OR</div>

14. B). i) A random variable has a Poisson distribution such that $P(1) = P(2)$, find mean of the distribution and $P(4)$.   5M.

       ii) In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for (a) more than 2150 hours, (b) less than 1950 hours and (c) more than 1920 hours and but less than 2160 hours.   5M

15. A). i) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population.   5M

       ii) A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Find the percentage of bad pineapples in the consignment.   5M

<div align="center">OR</div>

15. B). The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom $(t = 1.833$ at $\alpha = 0.05)$.   10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Object Oriented Programming Through JAVA
(CSM)

Date: 01.12.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	Why is Java said to be robust?	2 M
2.	What is java Byte code?	2 M
3.	Define Unchecked exception.	2 M
4.	What is the purpose of the inner class?	2 M
5.	Define multithreading.	2 M
6.	Compare Byte streams and character streams.	2 M
7.	How can we tokenize the string in Java?	2 M
8.	What is meant by generic class?	2 M
9.	List any two features of Swing.	2 M
10.	Write a java program to demonstrate AWT button class.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). i) What is polymorphism? Explain different types of polymorphisms with examples.   5M
ii) Develop a Java Program to find the reverse of a given number and check whether it is   5M
palindrome or not.

OR

11. B). i) Elaborate the procedure to create a package with multiple public classes.   5M
ii) Write a Java program to import user defined packages to perform arithmetic   5M
operations.

12. A). i) Describe the usage of try-catch-finally in Exception handling mechanism.   5M
ii) Design a program to create a user exception and then handle that exception in other   5M
program.

OR

12. B). Explain the four main types of inner classes in Java with suitable example.   10M

13. A). Elaborate in detail different ways of creating a thread using java.   10M

OR

13. B). i) With an example, demonstrate the concept of thread synchronization.   5M
ii) Design a multithreaded Java program that generates even and odd numbers from 1 to   5M
25 using two separate threads.

(P.T.O..)

14. A). What is Java Collections Framework? Explain Array List and Vector with an example 10M
program.

OR

14. B). Explain the various steps for connecting the database using JDBC API using a sample 10M
program.

15. A). Discuss the mouse event handling mechanism in Java using the Delegation Event Model. 10M

OR

15. B). Explain in detail any two layout managers with an example program. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Basic Electrical Engineering
(Common for CSM & AIM)

Date: 03.12.2025 FN	Time: 3 hours	Max.Marks: 70

(Note: Assume suitable data if necessary)

PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

|		
1.	Differentiate between ideal and practical sources.	2 M
2.	Write the V–I relations for resistor, inductor, and capacitor.	2 M
3.	Define RMS and average values of an alternating quantity.	2 M
4.	Define power factor and importance in AC circuits.	2 M
5.	Define efficiency of a DC Generator.	2 M
6.	Draw the characteristics of DC shunt Motor.	2 M
7.	What is the working principle of a single-phase transformer?	2 M
8.	Which side of the transformer is short-circuited during the SC test and why?	2 M
9.	Why is a three-phase induction motor called a self-starting motor?	2 M
10.	Draw the line diagram of squirrel cage rotors used in induction motors.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Describe the mesh current analysis method. Explain the step-by-step procedure for finding   10M
loop currents in a planar network.

OR

11. B). Find the current through 2Ω resistor using super position theorem.   10M
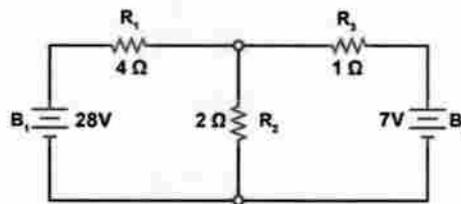
12. A). Derive the expression for current, impedance, and phase angle in a single-phase series   10M
RLC circuit.

OR

12. B). Derive the relation between line and phase voltage and current in a balanced 3 – Ø delta   10M
connected system.

A three-phase balanced delta connected load of (16+j64) Ω is connected across a 400V,
3 – Ø balanced supply. Determine the phase current I_R, I_Y, and I_B.

(P.T.O..)

13. A). Explain the construction and working principle of DC generator with a neat diagram. 10M

OR

13. B). Discuss the various types of DC Motors and their applications. 10M

14. A). With neat circuit diagrams explain the open circuit and short circuit tests. 10M

OR

14. B). i) List the different types of losses in a transformer, define efficiency of a transformer and derive the condition for maximum efficiency. 5M

ii) A50kVA,3300/330V, single phase transformer has iron loss and full load copper loss 400W and 600W respectively. Calculate the efficiency at half full load and 0.9p.f. Also calculate the load at which the efficiency is maximum. 5M

15. A). Describe the constructional details of a three-phase induction motor with a neat diagram. 10M

OR

15. B). Explain the torque-slip characteristics of a three-phase induction motor with a neat diagram. 10M

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: Basic Electrical & Elelctronics Engineering
(Common for CE & ME)

| Date: 03.12.2025 FN | Time: 3 hours | Max.Marks: 70 |

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   10x2=20M

1.	State Kirchhoff's laws.	2 M
2.	State Thevenin's theorem.	2 M
3.	List the applications of DC motors.	2 M
4.	Write the principle of operation of the dc motor.	2 M
5.	List the applications of 3 phase induction motor.	2 M
6.	State the principle of operation of the alternator.	2 M
7.	Write the applications of SCR.	2 M
8.	Write about the NPN junction transistor.	2 M
9.	What is meant by the deflection sensitivity of a CRO?	2 M
10.	State the principle of CRT.	2 M

PART-B
Answer the following. Each question carries TEN Marks.   5x10=50M

11.A). Derive the expressions for equivalent resistance in case of start to delta and delta to star conversion.   10M

OR

11. B). Determine the current 'i' in the circuit shown below. Apply mesh analysis   10M
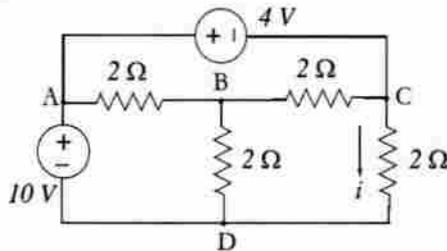
12. A). What is the necessity of starter in DC motor? Draw and explain about three-point starter.   10M

OR

12. B). Derive the EMF equation of the DC generator.   10M

13. A). A three-phase induction motor is wound for four poles and is supplied from a 50Hz supply. Determine (i) The synchronous speed (i) the speed of the rotor when the slip is 3% and (iii) the rotor frequency when the speed of rotor is 900 rpm.   10M

OR

13. B). With a neat circuit diagram explain the O.C. and S.C. tests on Transformer.   10M

(P.T.O..)

14. A). Explain the principle of operation of full-wave rectifiers with neat waveforms.   10M

OR

14. B). Explain P-n junction diode and its V-I characteristics.   10M

15. A). With neat diagram explain the essential components of a CRT.   10M

OR

15. B). Explain about Measurement of Voltage and Current by CRO.   10M

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H.T No: [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]   **R18**   Course Code: A30006

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B.Tech III Semester Supplementary Examinations Nov/Dec-2025
Course Name: **Numerical Methods & Complex Variables**
(Common for EEE & ECE)

Date: 24.11.2025 FN   Time: 3 hours   Max.Marks: 70

(Note: Assume suitable data if necessary)
PART-A
Answer all TEN questions
Each question carries TWO marks.   **10x2=20M**

1. Using Laplace transform evaluate $\int_0^\infty te^{-3t}\sin t\, dt$ 2 M

2. State Convolution Theorem.   2 M

3. Write the Newton-Raphson iterative formula to find the reciprocal of a number N(N > 0).   2 M

4. Write Newton's forward interpolation formula.   2 M

5. Find the value of $\int_0^1 \frac{dx}{1+x^2}$ by Simpsons $\frac{1}{3}$ rule (taking $h=\frac{1}{4}$).   2 M

6. Find the approximate value of y (0.2)for the initial value problem $y' = x + y, y(0) = 1$ by   2 M
    Euler's method with step size h=0.1.

7. Prove that the real and imaginary parts of an analytic function $f(z)=z^2$ satisfy Cauchy-   2 M
    Riemann equations.

8. Write the Polar form of Cauchy Riemann Equations.   2 M

9. Find the poles of $f(z) = \frac{e^z}{\cos z}$ in $|z| = 2$.   2 M

10. Define Isolated singular point.   2 M

PART-B
Answer the following. Each question carries TEN Marks.   **5x10=50M**

11.A). i) Define unit step function and find the Laplace transform of unit step function. Evaluate   5M
        $L(t\, u(t - 2))$.

        ii) Find $L^{-1}\left(\frac{2s+3}{s^3-6s^2+11s-6}\right)$.   5M

OR

11. B).   10M
        Solve the following differential equation using the Laplace transforms
        $$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = 5\sin t, y(0) = y'(0) = 0$$

12. A). i) Find the positive root of the equation $x^3 = 2x+5$ by using iteration method.   5M

         ii) Explain Newton-Raphson method to solve the equation f(x)=0. Using this method find   5M
         an approximate root of $e^{-x} - \sin x = 0$.

(P.T.O..)

OR

12. B). From the following table of values of x and f(x) determine f(0.29)   10M

x	0.20	0.22	0.24	0.26	0.28	0.30
f(x)	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

13. A). Evaluate $\int_0^6 \frac{dx}{(1+x^2)}$ by using (i) Trapezoidal rule (ii) Simpson's one –third rule   10M
(iii) Simpson's 3/8 rule by dividing the interval [0,6] into K subintervals. Take the value
K such that all these three methods can be applied with such division. The approximate
definite integral value obtained by which method is nearer to the actual value?

OR

13. B). Find the value of 'y' at x=0.2 by solving the Initial value Problem $\frac{dy}{dx} = log(x + y)$,   10M
y(0)=1 by using R.K method.

14. A). Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin even though Cauchy-   10M
Riemann equations are satisfied at that point.

OR

14. B). Determine the analytic function whose real part is $log \sqrt{x^2 + y^2}$.   1C...

15. A). Expand $f(z) = \frac{z}{(z^2-1)(z^2+4)}$ for (i) $1 < |z| < 2$ (ii) $|z| > 2$ by Laurent expansion.   10M

OR

15. B). i) Find the poles of the function $f(z) = \frac{1}{(z+1)(z+3)}$ and residues at these points.   5M

ii) Evaluate $\int_c \frac{ze^z}{z^2+9} dz$ where c is $|z| = 5$ by Cauchy's Residues theorem.   5M

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