

H.T No:

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R18

Course Code: A30202



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations December-2024

Course Name: **Electro Magnetic Fields**

(Electrical & Electronics Engineering)

Date: 21.12.2024 AN

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 gradient and divergence. | 2 M |
| 2. What is the significance of line integral? | 2 M |
| 3. Explain the Maxwell's First Law? | 2 M |
| 4. Explain the relationship between potential and electric field intensity. | 2 M |
| 5. Define current density and interpret the relation between current and current density. | 2 M |
| 6. List the difference between conductors and dielectrics. | 2 M |
| 7. Define magnetic field intensity, magnetic flux density. What is the relationship between these two? | 2 M |
| 8. Develop Maxwell's equation derived from Ampere's law. | 2 M |
| 9. What is the significance of displacement current? | 2 M |
| 10. List Maxwell's equations for time varying fields. | 2 M |

PART-B

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

- | | |
|--|-----|
| 11.A). Recall the gradient, divergence and curl theorems along with their implications | 10M |
| OR | |
| 11. B). Express the terms differential length, differential surface area and differential volume in cylindrical coordinate system. What are the limiting values of (ρ , ϕ , z)? | 10M |
| 12. A). Apply Gauss law, derive the expression for electric field intensity due to an infinite length of line charge. | 10M |
| OR | |
| 12. B). Develop the expression for Potential gradient. | 10M |
| 13. A). Explain the concept of polarization of dielectrics | 10M |
| OR | |
| 13. B). Develop Laplace and Poisson equation. | 10M |
| 14. A). Using Biot-Savart's law, find the magnetic field intensity on the axis of a circular loop with radius R and carrying a steady current I. | 10M |
| OR | |
| 14. B). Find the magnetic field intensity at the centre of square loop of side 5m carrying 10A of current. | 10M |
| 15. A). Demonstrate Faraday's law of electromagnetic induction. | 10M |
| OR | |
| 15. B). A 30 cm \times 40 cm loop rotates at 130 rad/s in a magnetic field 0.06 Wb/m ² normal to the axis of rotation. If the loop has 50 turns, determine the induced voltage in the loop. | 10M |



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations December-2024

Course Name: **Fluid Mechanics & Hydraulic Machinery**
(Electrical & Electronics Engineering)

Date: 24.12.2024 AN

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 Surface tension and Capillarity. 2 M
2. State Pascal's law. 2 M
3. Define the Rotational flow and Uniform flow. 2 M
4. State Bernoulli's energy equation. 2 M
5. List out the minor losses in closed conduits. 2 M
6. Define the Shear drag and Form drag. 2 M
7. Define the following terms with respect to performance of turbines: 2 M
 - (i) Unit power.
 - (ii) Unit discharge
8. Draw the velocity triangle for pelton wheel turbine. 2 M
9. Why surge tank is provided in the penstocks? 2 M
10. Draw the velocity triangles for centrifugal pump. 2 M

PART-B

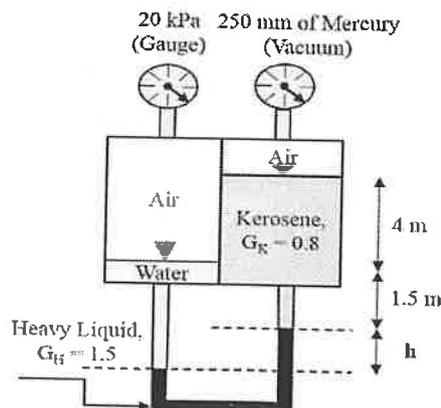
Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) With a neat sketch explain the Newton's law of viscosity. 4M
- ii) The bearing of an engine is 10 cm in diameter and 5 cm long. The engine runs at 3000 rpm. The clearance between the bearing and journal is 0.5 mm and the viscosity of lubricating oil is 0.44 Ns/m². Assume that the velocity of oil film varies linearly with radius. Calculate the power lost in the bearing. 6M

OR

11. B). i) With neat sketches explain differential manometers. 5M
- ii) A closed vessel is divided into two compartments. These compartments contain kerosene and water as shown in the figure. Determine the value of 'h', if the gauges show the readings as shown in the figure. 5M



(P.T.O..)

12. A). Derive the three dimensional continuity equation in Cartesian co-ordinates. 10M

OR

12. B). At a point in the pipe line where diameter is 20 cm, the velocity of water is 4 m/s and the pressure is 343 kN/m². At a point 15 m downstream the diameter reduces to 10 cm. Calculate the pressure at this point, if the pipe is (i) horizontal (ii) vertical with flow downward (iii) vertical with flow upward. 10M

13. A). Enumerate with neat sketch lift and drag on an airfoil. 10M

OR

13. B). A pipe line of 600 mm diameter is 1500 m long. To increase the discharge, another line of the same diameter is introduced parallel to the first in second – half of the length. Take Darcy's friction factor = 0.01 and head at inlet is 300 mm. Calculate the increase in discharge. Neglect minor losses. 10M

14. A). A jet of water, 10 cm in diameter having a velocity of 30 m/s strikes a series of vanes with a velocity of 15 m/s. The jet makes an angle of 30° with respect to direction of motion of vanes when entering and leaves at an angle of 120°. Sketch velocity triangles at inlet and outlet of vanes and compute vane angles, so that water enters and leaves without shock and also compute efficiency. 10M

OR

14. B). A Pelton wheel is to be designed to develop 1 MW at 400 rpm. It is to be supplied with water from a reservoir whose level is 250 m above the wheel through a pipe 900 m long. The pipe line losses are 5 % of gross head. The coefficient of friction is 0.005. The bucket speed is to be 0.46 of jet speed. Efficiency of wheel is 85 %. Calculate the wheel diameter, jet diameter and pipe line diameter. Take $C_v = 0.98$. 10M

15. A). Illustrate with neat sketch, series and parallel operation of centrifugal pump. 10M

OR

15. B). A centrifugal pump impeller having 200 mm diameter at inlet and 400 mm diameter at outlet. The impeller vanes are setback at angle of 45° to the outer rim and entry of the pump is radial. The pumps runs at 1000 rpm and the velocity of flow through the impeller is constant at 3 m/s. Calculate work done per unit weight of water and sketch velocity triangles. 10M

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Course Code: A30201



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations December-2024

Course Name: Network Theory-I

(Electrical & Electronics Engineering)

Date: 19.12.2024 AN

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

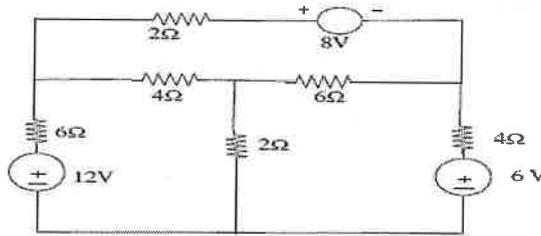
1. Define the ideal Voltage and Ideal current. 2 M
2. State Kirchoff's Voltage Law (KVL) and provide its significance in circuit analysis. 2 M
3. Determine the impedance and phase angle of RC series circuit. 2 M
4. Define the reactive power. 2 M
5. Write the expression for quality factor and band width for RLC series circuit. 2 M
6. Determine the equivalent inductance for 2 mutually coupled series aided circuit. 2 M
7. Define the twigs and links in a basic tree. 2 M
8. List any four duality parameters. 2 M
9. State the Maximum Power Transfer Theorem. 2 M
10. List the limitations of super position theorem. 2 M

PART-B

Answer the following. Each question carries TEN Marks.

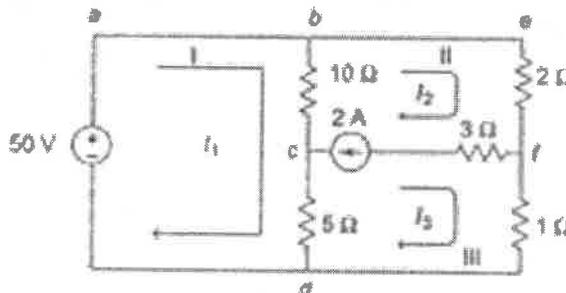
5x10=50M

- 11.A). i) Classify the dependent sources? 4M
 ii) Find loop currents for given circuit and find the power delivered from the three sources? 6M



OR

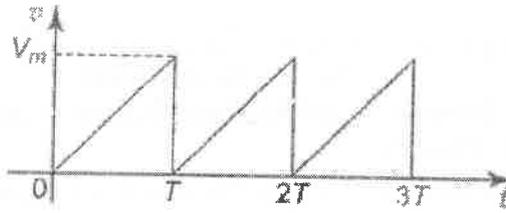
11. B). Determine the current in 5Ω resistor for given circuit using Mesh analysis. 10M



(P.T.O.)

12. A). Determine the form factor and peak factor for given waveform.

10M



OR

12. B). Derive the expression for average value and RMS value for sinusoidal waveform.

10M

13. A). i) Draw the locus of current of a series circuit consisting of resistance and inductance with resistance varies and inductive reactance fixed, when supplied by a constant ac voltage source, lies on a circular path.

5M

ii) Determine the lower cut-off frequency, upper cut-off frequency, bandwidth and quality factor of a coil for the series circuit consisting of $R=10\Omega$, $L=0.1H$ and $C=10\mu F$.

5M

OR

13. B). i) Derive the co-efficient of coupling for two coupled circuits.

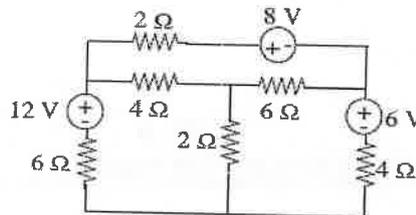
5M

ii) Derive the equations of bandwidth and quality factor for series RLC circuit.

5M

14. A). Determine the incidence matrix for given network obtain nodal equations and branch currents.

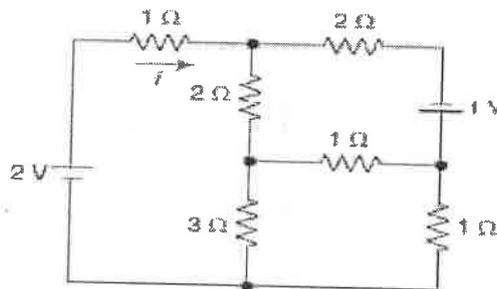
10M



OR

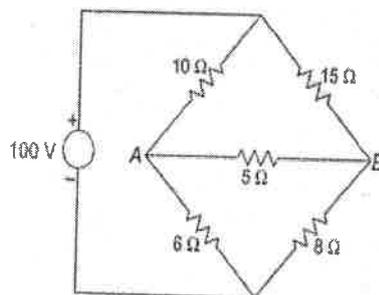
14. B). Obtain the tie-set matrix for the network shown in fig. Draw the oriented graph. Write the nodal equations and branch currents.

10M



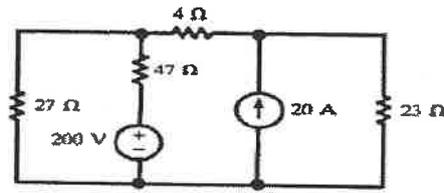
15. A). i) Define the thevenin's theorem and determine the current flowing through 5Ω resistor using thevenin's theorem.

5M



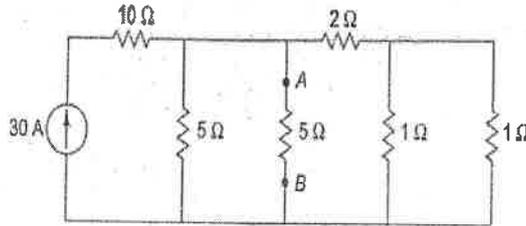
((P.T.O.))

ii) Define the superposition theorem. Determine the current flowing through the 23Ω resistor using superposition theorem. 5M



OR

15. B). Define the Norton's theorem. Determine the current flowing through the 5Ω resistor using Norton's theorem. 10M



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Course Code: A30203



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

B.Tech III Semester Supplementary Examinations Dec-2024/ Jan-2025

Course Name: Electrical Machines-I

(Electrical & Electronics Engineering)

Date: 09.01.2025 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 linear and nonlinear magnetic circuits? 2 M
2. What is mean by B-H curve of magnetic materials? 2 M
3. List out the difference between Lap and Wave windings of DC machine. 2 M
4. Define linear commutation and explain. 2 M
5. What are the functions of no-voltage release coil and over load release coil in dc motor starter? 2 M
6. Define critical field resistance of DC machine. 2 M
7. Draw the exact equivalent circuit of a Transformer. 2 M
8. Distinguish between step-up and step-down transformers? 2 M
9. What are the advantages of single three phase transformer unit over a bank of single phase transformers? 2 M
10. What are the advantages of auto transformer over two winding transformer? 2 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Derive the expression for the forces developed in electro magnetic system. 10M
- OR**
- 11.B). All energy conversion devices use magnetic field as a coupling medium rather than electrical field. Explain why? 10M
- 12.A). With neat sketch explain the construction of DC machine and explain function of each component. 10M
- OR**
- 12.B). Derive the expression for demagnetizing Armature Ampere Turns per pole of DC Machine. 10M
- 13.A). What is the necessity of starter for starting any DC machine? Explain with a neat sketch, the function of a 3-point starter. 10M
- OR**
- 13.B). Hopkinson's test on two similar DC shunt machines gave the following data: Line voltage 230V, line current excluding both the field currents is 40A, motor armature current 350A, field currents 5A and 4.2A. Calculate the efficiency of each machine. Armature resistance of each machine is 0.02Ω . 10M

(P.T.O.)

14. A). With the help of neat sketch, explain in detail about parallel operation of single phase transformers. 10M

OR

14. B). A 5KVA, 1000/200 V, 50 Hz single phase transformer gave the following test results: 10M
Open circuit test (LV side): 200 V, 1.2 A, 90 W
Short circuit test (HV side): 50 V, 5 A, 110 W.
Compute the parameters of approximate equivalent circuit referred to LV side.

15. A). Three number of single phase ideal transformers, each of rating 5 kVA, 200V/100V, 50 Hz is connected in star/delta fashion to supply a balanced three phase 10 kW, 0.8 power factor load at 100 V (line to line). Calculate line and phase currents on the secondary and primary sides. 10M

OR

15. B). Explain the working principle of single-phase auto transformer with neat diagrams. 10M
Explain the Scott connection of transformer in detail with neat sketch.
