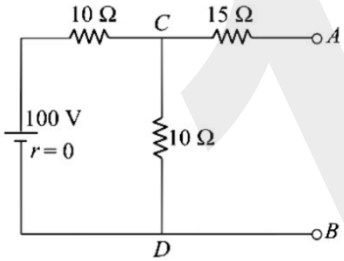


QP Code:D 123037		Total Pages: 2	Name:
			Register No.
SECOND SEMESTER (CUFYUGP) DEGREE EXAMINATION APRIL 2025			
(PHYSICS)			
PHY2MN101 Electromagnetism and Network Theorems			
2024 Admission onwards			
Maximum Time :2 Hours		Maximum Marks :70	
Section A			
All Questions can be answered. Each Question carries 3 marks (Ceiling: 24 Marks)			
1	Distinguish between electric constant and dielectric constant?		
2	What is a test charge? How is electric field intensity at a point defined?		
3	Write the expression for the torque experienced by a dipole in a uniform electric field. Under what conditions is the torque maximized and minimized?		
4	What is Gauss's law for magnetism?		
5	What is magnetic moment and how is it related to the electric current?		
6	Why is the net force on a current-carrying loop in a uniform magnetic field always zero?		
7	State Biot-Savart's law.		
8	Write the expression for the force experienced by a moving charge in a uniform magnetic field and discuss the resulting trajectory of the particle.		
9	State the superposition theorem for a DC network.		
10	What are capacitive reactance and inductive reactance?		
Section B			
All Questions can be answered. Each Question carries 6 marks (Ceiling: 36 Marks)			
11	A point charge $q = -8.0 \text{ nC}$ is located at the origin. Find the electric-field vector at the field point $x = 1.2 \text{ m}$, $y = -1.6 \text{ m}$.		
12	A flat, circular loop of radius 0.1 m is placed in a uniform magnetic field of magnitude 0.50 T . The plane of the loop is tilted at an angle of 30° with respect to the direction of the magnetic field. Find the magnetic flux passing through the loop.		
13	A circular coil 0.05 m in radius, with 30 turns of wire, lies in a horizontal plane. It carries a counter clockwise (as viewed from above) current of 5.00 A . The coil is in a uniform 1.20 T magnetic field directed toward the right. Find the magnitudes of the magnetic moment and the torque on the coil.		
14	Two straight, parallel, superconducting wires 4.5 mm apart carry equal currents of $15,000 \text{ A}$ in opposite directions. What force, per unit length, does each wire exert on the other?		

15	Convert the voltage source of 10 V with series resistor 5Ω into an equivalent current source and draw the equivalent circuit.
16	Using Norton's theorem, find the constant-current equivalent of the circuit shown in Fig. 
17	Two batteries A and B are connected in parallel across a 20Ω load. Battery A has e.m.f. = 9 V and internal resistance 1.5Ω . Battery B has e.m.f. = 12 V and internal resistance 2Ω . Using Kirchhoff's laws, determine: (a) The current supplied by each battery. (b) The total current in the circuit. (c) The potential difference across the load resistance.
18	Discuss about the phase relationship between voltage and current when AC flows through a resistor?
Section C	
Answer any ONE. Each Question carries 10 marks (1x10=10 Marks)	
19	Explain the behaviour of AC current in a circuit containing resistance and inductance. How does inductance affect the current and voltage relationship?
20	State Ampere's law and find the expression for magnetic field due to a solenoid and toroid.