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Register No. [ ]

ERODE – First Mid-Term Test - 2023

PHYSICS

Time : 1.30 Hrs. Marks : 50

I. Answer all the questions. 10 x 1 = 10

1. A electric dipole is placed at an alignment angle of 30^0 with an electric field of 2×10^5 NC^{-1}. It experiences a torque equal to 8 Nm. The charge on dipole if the dipole length is 1cm is
   a) 4 mC b) 8 mC c) 5 mC d) 7 mC
2. If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion.
   a) Q remains the same, C is doubled b) Q is doubled, C doubled
   c) C remains same, Q doubled d) Both Q and C remain same
3. Two metallic spheres of radii 1 cm and 3 cm are given charges of -1×10^{-2} C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is
   a) 3×10^{-2} C b) 4×10^{-2} C c) 1×10^{-2} C d) 2×10^{-2} C
4. A toaster operating at 240V has a resistance of 120 Ω. Its power is
   a) 400 W b) 2 W c) 480 W d) 240 W
5. In Joule's heating law, when R and t are constant if the H is taken along the Y axis and I^2 along the X axis, the graph is
   a) straight line b) parabola c) circle d) ellipse
6. A circular coil of radius 5 cm and 50 turns carrier a current of 3 ampere. The magnetic dipole moment of the coil is nearly
   a) 1.0 Am^2 b) 1.2 Am^2 c) 0.5 Am^2 d) 0.8 Am^2
7. A non-conducting charged ring carrying a charge of q, mass m and radius r is rotated about its axis with constant angular speed ω. Find the ratio of its magnetic moment with angular momentum is
   a) $\frac{q}{m}$ b) $\frac{2q}{m}$ c) $\frac{q}{2m}$ d) $\frac{q}{4m}$
8. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?
   a) 30^0 b) 45^0 c) 60^0 d) 90^0
9. The current in the wire if the charge of 120C is flowing through a copper wire in 2 minute.
   a) 2A b) 3A c) 1A d) 4A
10. The unit of permittivity of free space is
    a) C^2Nm^{-1} b) $C^2N^{-1}m^2$ c) $C^2N^{-1}m^{-2}$ d) $C^2N^{-1}m^{-1}$

II. Answer any five questions. Q.No.13 is compulsory. 5 x 2 = 10

11. Define electric field?
12. What is corona discharge?
13. A sample of HCL gas is placed in a uniform electric field of magnitude 3×10^4 NC^{-1}. The dipole moment of each HCl molecule is 3.4×10^{-30} Cm. Calculate the maximum torque experienced by each HCl molecule.

14. State Kirchhoff's voltage law.
15. What is Peltier effect?
16. Define magnetic flux.
17. State Fleming's left hand rule.
18. What is meant by hysteresis?

III. Answer any five questions. Q.No.24 is compulsory. **5 x 3 = 15**

19. How is a galvanometer converted into ammeter.
20. Give the properties of dia, para, ferromagnetic materials.
21. Give the account of magnetic lorentz force.
22. Distinguish between drift velocity and mobility.
23. State the applications of Seebeck effect.
24. If the resistance of coil is 3Ω at 20^0C, and $\alpha = 0.004/^0C$ then determine its resistance at 100^0C.
25. Obtain gauss law from Coulomb's law.
26. What are the difference between Coulomb force and gravitational force?

V. Answer all the questions. **3 x 5 = 15**

27. a) Explain in detail the construction and working of a Van de Graaff generator.

(OR)

b) Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.

28. a) Calculate the electric field due to a dipole on its axial line.

(OR)

b) Obtain the condition for bridge balance in Wheatstone's bridge.

29. a) Describe the microscopic model of current and obtain general form of Ohm's law.

(OR)

b) Discuss the working of cyclotron in detail.