SIR CV RAMAN COACHING CENTRE IDAPPADI,SALEM

XLL PHYSICS – UNIT 1 TO 3

FIRST MID TERM MODEL QUESTION PAPER – 2

TOTAL MARK : 70 M

DATE : 03.06.2024

Choose the correct best answer (15 x 1 = 15 m)

1. 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

2. Two points A and B are maintained at a potential of 7 V and -4 V respectively. The work done in moving 50 electrons from A to B is

 (a) 8.80×10^{-17} J   (b) -8.80×10^{-17}J   (c) 4.40×10^{-17} J   (d) 5.80×10^{-17} J

3. An electric dipole is placed at an alignment angle of 30^0 with an electric field of 2×10^5 N C^{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is

 (a) 4 mC   (b) 8 mC   (c) 5 mC   (d) 7 mC

4. For a smaller radius, the charge density will be …………..

 a) larger   b) smaller   c) both a and b   d) none of the above

5. A wire connected to a power supply of 230 V has power dissipation P1 . Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is P2 . The ratio P2/ P 2 is

 (a)1   (b) 2   (c) 3   (d) 4

6.The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of 10 Ω is

 a) 0.2 Ω   b) 0.5 Ω   c) 0.8 Ω   d) 1.0 Ω

7. In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1kW are connected. The voltage of electric mains is 220 V. The maximum capacity of the

main fuse of the building will be

 (a) 14 A   (b) 8 A   (c) 10 A   (d) 12 A

8. In a Wheatstone's bridge P = 100 Ω, Q = 1000 Ω and R = 40 Ω. If the galvanometer shows zero deflection, determine the value of S.

  a) 400 ohm   b) 255 ohm   c) 550 ohm   d) 890 ohm

9. A circular coil of radius 5 cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly

(a) 1.0 A m^2 (b) 1.2 A m^2 (c) 0.5 A m^2 (d) 0.8 A m^2

10. Two short bar magnets have magnetic moments 1.20 Am^2 and 1.00 Am^2 respectively. They are kept on a horizontal table parallel to each other with their north poles pointing towards south. They have a common magnetic equator and are separated by a distance of 20.0 cm. The value of the resultant. horizontal magnetic induction at the mid-point O of the line joining their centres is (Horizontal components of Earth's magnetic induction is 3.6×10^{-5} Wb m^{-2}

 (a) 3.60×10^{-5} Wb m^{-2} (b) 3.5×10^{-5} Wb m^{-2} (c) 2.56×10^{-2} Wb m^{-2} (d) 2.2×10^{-4} Wb m^{-2}

11. 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

12. Three wires of equal lengths are bent in the form of loops. One of the loops is circle, another is a semi-circle and the third one is a square. They are placed in a uniform magnetic field and same electric current is passed through them. Which of the following loop configuration will experience greater torque ?

 (a) Circle   (b) Semi-circle   (c) Square   (d) All of them

13. Bohr magneton which is used to measure atomic magnetic moments, its values

 a) 9.27×10^{-24} Am^2 b)) 8.27×10^{-24} Am^2 c)) 6.27×10^{-24} Am^2 d)) 1.27×10^{-24} Am^2

14. 1W =

 a) 1 j / s   b) 1 js   c) 1 js^2 d) js^{-2}.

15. Microwave oven works on the principle of ………….. acting on an electric dipole.

 a) torque   b) electrostatic induction   c) action of point   d) All

Answer any six questions compulsory.Q.No 24

16. The electric field lines never intersect. Justify.

17. Define 'capacitance'. Give its unit.

18. Calculate the electric flux through the rectangle of sides 5 cm and 10 cm kept in the region of a uniform electric field 100 N/C. The angle θ is 60^0 . If θ becomes zero, what is the electric flux?

19. Why current is a scalar?

20. State the applications of Seebeck effect.

21. Two materials X and Y are magnetised whose values of intensity of magnetisation are 500 A m^{-1} and 2000 A m^{-1} respectively. If the magnetising field is 1000 A m^{1}, then which one among these materials can be easily magnetized?

22. State Ampere's circuital law.

23. Is an ammeter connected in series or parallel in a circuit? Why?

24. Find the heat energy produced in a resistance of 10 Ω when 5 A current flows through it for 5 second.

Answer any six questions compulsory.Q.No 33.

25.Write down the various forms of expression for power in electrical circuit.

26. Explain the determination of the internal resistance of a cell using voltmeter.

27. Determine the number of electrons flowing per second through a conductor, when a current of 32 A flows through it.

28. Consider a magnetic dipole which on switching ON external magnetic field orient only in two possible ways i.e., one along the direction of the magnetic field (parallel to the field) and another anti-parallel to magnetic field. Compute the energy for the possible orientation.

29. Give an account of magnetic Lorentz force

30. What is tangent law?

31. Obtain Gauss law from Coulomb's law.

32. What are the differences between Coulomb force and gravitational force?

33. Calculate the number of electrons in one coulomb of negative charge.

Answer all questions (5 x 5 = 25 m)

34 a) Calculate the electric field due to a dipole on its equatorial plan

(OR)

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

35 a) Derive the expression for resultant capacitance, when capacitors are connected in series and in parallel

(OR)

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

36 a) State and explain Kirchhoff 's rules

(OR)

b) Obtain the macroscopic form of Ohm's law from its microscopic form and discuss its limitation.

37 a) Find the magnetic field due to a long straight conductor using Ampere's circuital law

(OR)

b) Calculate the magnetic field at a point on the axial line of a bar magnet.

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

(OR)

b) Give the properties of dia / para / ferromagnetic materials.

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