

QUARTERLY EXAMINATION-2021-22
MODEL QUESTION PAPER
PHYSICS

STD : XII

TIME - 3 HRS
MARKS – 70

I. CHOOSE THE CORRECT ANSWER

12 x 1 = 12

1. Two identical conducting balls having positive charges q_1 and q_2 are separated by a center to center distance r . If they are made to touch each other and then separated to the same distance, the force between them will be-
 - a. (a) less than before (b) same as before
 - (c) more than before (d) zero

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. (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. 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. (a) 3×10^{-2} C (b) 4×10^{-2} C
 - (c) 1×10^{-2} C (d) 2×10^{-2} C

4. An electric field $E = 10xi^{\wedge}$ exists in a certain region of space. Then the potential difference $V = V_0 - V_A$, Where V_0 is the potential at the origin and V_A is the potential at $x = 2$ m is-
 - a. (a) 10 J (b) -20 J (c) + 20 J (d) - 10 J
5. Which charge configuration produces a uniform electric field?
 - (a) point charge (b) the infinite uniform line charge
 - (c) uniformly charged infinite plane (d) uniformly charged spherical shell

6. A toaster operating at 240 V has a resistance of 120 Ω . The power is
 - (a) 400 W (b) 2 W (c) 480 W (d) 240 W

7. A carbon resistor of (47 ± 4.7) k Ω to be marked with rings of different colours for its identification. The colour code sequence will be
 - (a) Yellow – Green – Violet – Gold (b) Yellow – Violet – Orange – Silver
 - (c) Violet – Yellow – Orange – Silver (d) Green – Orange – Violet – Gold

8. Two wires of A and B with circular cross section made up of the same material with equal lengths. Suppose $R_A = 3 R_B$, then what is the ratio of radius of wire A to that of B?
 - (a) 3 (b) $\sqrt{3}$ (c) $1/\sqrt{3}$ (d) $1/3$

9. The temperature coefficient of resistance of a wire is 0.00125 per $^{\circ}\text{C}$. At 300 K, its resistance is 1 Ω . The resistance of the wire will be 2 Ω . At
 - (a) 1154 K (b) 1100 K (c) 1400 K (d) 1127 K

10. 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

11. 11. A thin insulated wire forms a plane spiral of $N = 100$ tight turns carrying a current $I = 8$ mA (milli ampere). The radii of inside and outside turns are $a = 50$ mm and $b = 100$ mm respectively. The magnetic induction at the center of the spiral is
- (a) $5 \mu\text{T}$ (b) $7 \mu\text{T}$ (c) $8 \mu\text{T}$ (d) $10 \mu\text{T}$
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. 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 the 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 centers is (Horizontal components of Earth's magnetic induction is $3.6 \times 10^{-5} \text{ Wb m}^{-2}$)
- (a) $3.60 \times 10^{-5} \text{ Wb m}^{-1}$ (b) $3.5 \times 10^{-5} \text{ Wb m}^{-1}$
 (c) $2.56 \times 10^{-4} \text{ Wb m}^{-1}$ (d) $2.2 \times 10^{-4} \text{ Wb m}^{-1}$
14. 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° (b) 45° (c) 60° (d) 90°
15. A simple pendulum with charged bob is oscillating with time period T and let θ be the angular displacement. If the uniform magnetic field is switched ON in a direction perpendicular to the plane of oscillation then-
- (a) time period will decrease but θ will remain constant
 (b) time period remain constant but θ will decrease
 (c) both T and θ will remain the same
 (d) both T and θ will decrease

II ANSWER ANY SIX QUESTIONS. Q.NO 24 IS COMPULSORY:

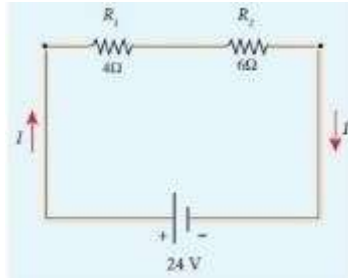
6 x 2 = 12

16. Define 'Electric field'.
17. Define 'Electric dipole'.
18. Define electrical resistivity.
19. Define temperature coefficient of resistance.
20. State Kirchhoff's current rule.
21. State Coulomb's inverse law.
22. State Ampere's circuital law.
23. Define magnetic dipole moment.
24. Calculate the number of electrons in 1C negative charge.

III ANSWER ANY SIX QUESTIONS Q.NO 33 IS COMPULSORY:

6 x 3 = 18

- 25) Obtain Gauss law from Coulomb's law.
- 26) Obtain the expression for energy stored in the parallel plate capacitor.
- 27) Derive an expression for the torque experienced by a dipole due to a uniform electric field.
- 28) Calculate the equivalent resistance for the circuit which is connected to 24 V battery and also find the potential difference across each resistor $4\ \Omega$ and $6\ \Omega$ in the circuit.



- 29) State Seebeck effect and give its application
- 30) Obtain an expression for net resistance of Resistors connected in parallel.
- 31) Explain how current loop act as magnetic dipole.
- 32) State end rule.
- 33) A cell supplies a current of 0.9 A through a $2\ \Omega$ resistor and a current of 0.3 A through a $7\ \Omega$ resistor. Calculate the internal resistance of the cell.

IV Answer the following questions in detail :

5 x 5 = 25

- 34) a) Calculate the electric field due to a dipole on its axial line.
(Or)
b) Obtain the expression for electric field due to an infinitely long charged wire.
- 35) a) Obtain the condition for bridge balance in Wheatstone's bridge.
(Or)
b) Obtain a relation for the magnetic field at a point along the axis of a circular coil carrying current.
- 36) a) Explain in detail the construction and working of a Van de Graaff generator.
(Or)
b) Explain the determination of unknown resistance using meter bridge.
- 37) a) Obtain a relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current. (Or)
b) Derive an expression for electrostatic potential due to an electric dipole.
- 38) a) Describe the microscopic model of current and obtain general form of Ohm's law.
(Or)
b) Obtain the expression for electric field due to a charged infinite plane sheet.
