CLASS: 11   QUARTERLY MODEL QUESTION PAPER – 2022   MARKS: 70

TIME: 3 HOURS   PHYSICS

CHOOSE THE BEST   PART – A   8 X 1 = 8

1. 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) $– 8.80 \times 10^{-17}$ J   c) 4.40×10^{-17} J   d) 5.80×10^{-17} J

2. The unit of electric flux is   a) V m   b) N C^{-1} m   c) N m^2 C   d) C^2 N^{-1} m^{-2}

3. A wire connected to a power supply of 230 V has power dissipation P_1. Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is P_2. The ratio P_2 / P_1 is

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

4. 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

5. Susceptibility is nearly temperature independent in   a) Fe   b) Al   c) Bi   d) Cr

6. When the plane of the loop is parallel to the magnetic field, the torque on the current loop is

   a) minimum and IAB   b) zero   c) maximum and IAB   d) maximum and BIl

6. 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. The ratio of its magnetic moment with angular momentum is

   a) $\frac{q}{m}$ b) $\frac{2q}{m}$ c) $\frac{q}{2m}$ d) $\frac{q}{4m}$

7. The energy stored per unit volume of space of an inductor is u_B =

   a) $\frac{B^2}{2\mu_0}$ b) $\frac{B}{2\mu_0}$ c) $\frac{2B}{\mu_0}$ d) $\frac{2B^2}{\mu_0}$

8. The equation for a sinusoidal voltage of 50 Hz and peak value 15 V is

   a) 15 sin 314 t   b) 15 sin (2π x 50) t   c) 15 sin (100 x 3.14) t   d) all the three

9. In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference between the voltage and current in the circuit is   a) $\pi / 4$ b) $\pi / 2$ c) $\pi / 6$ d) zero

10. Consider an oscillator which has a charged particle oscillating about its mean position with a frequency of 300 MHz. The wavelength of electromagnetic waves produced by this oscillator is

    a) 1 m   b) 10 m   c) 100 m   d) 1000 m

11. UV rays are used in   a) heat therapy   b) burglar alarm   c) studying crystal structure   d) food industry

12. The speed of light in an isotropic medium depends on

    a) its intensity   b) its wavelength   c) the nature of propagation   d) the motion of the source w.r.to medium

13. If the focal length is 150 cm for a lens then the power of the lens in dioptre (D) is

    a) 1 D   b) 0.5 D   c) 0.75 D   d) 0.67 D

14. In a Young's double slit experiment, the slit separation is doubled. To maintain the same fringe spacing on the screen the screen -to-slit distance D must be changed to   a) 2 D   b) D / 2   c) $\sqrt{2}$ D   d) D / $\sqrt{2}$

15. Two coherent monochromatic light beams of intensities I and 4 I are superposed. The maximum and minimum possible intensities in the resulting beam are

   a) 5 I and I   b) 5 I and 3 I   c) 9 I and I   d) 9 I and 3 I

   Question number 24 is compulsory   **PART – B**   **6 x 2 = 12**

16. State Gauss law   17. Distinguish between drift velocity and mobility.

18. State Fleming's left hand rule   19. Write the uses of infrared rays.

20. Mention the methods of producing induced emf

21. In a meter bridge experiment, the value of resistance in the resistance box connected in the right gap is 10 Ω. The balancing length is l_1 = 55 cm. Find the value of unknown resistance.

22. Why does the sky appear blue?   23. Write any two differences between Fresnel and Fraunhofer diffraction.

24. An ideal transformer has 460 and 40,000 turns in the primary and secondary coils respectively. Find the voltage developed per turn of the secondary if the transformer is connected to a 230 C A.C. mains.

   Question number 33 is compulsory   **PART – C**   **6 X 3 = 18**

25. Derive an expression for electrostatic potential at a point due to a point charge.

26. What is Seebeck effect? Write its applications.

27. The repulsive force between two magnetic poles in air is 9 x 10^{-3} N. If the two poles are equal in strength and are separated by a distance of 10 cm, calculate the pole strength of each pole.

28. How will you induce an emf by changing the area enclosed by the coil?

29. Derive an expression for the effective resistance of resistors connected in series.

30. Compare the properties of dia, para and ferro magnetic substances.

31. Light travels from air into a glass slab of thickness 50 cm and refractive index 1.5. Find (i) speed of light in The glass slab   (ii) time taken by the light to travel through the glass slab.

32. Two light sources of equal amplitudes interfere with each other. Calculate the ratio of maximum and minimum intensities.   33. Describe Hertz experiment.

   Answer all the questions   **PART – D**   **5 x 5 = 25**

34. Derive an expression for the electrostatic potential at a point due to an electric dipole. OR

   Explain the principle, construction and working of a transformer.

35. (i) Write any six characteristics of electromagnetic waves. (ii) Compute the speed of the electromagnetic wave in a medium if the amplitude of electric and magnetic fields are 3 x 10^4 N C^{-1} and 2 x 10^{-4} T, respectively.   OR

   Find out the phase relationship between voltage and current in a pure inductive circuit.

36. Obtain the condition for bridge balance in Wheatstone's bridge. OR

   Derive an expression for the force on a current carrying conductor in a uniform magnetic field.

37. Compute the electric field at a point on the equatorial line of an electric dipole   OR   Derive the mirror equation.

38. Describe the working of cyclotron in detail.   OR How the emf of two cells are compared using potentiometer?