Class : 12

Register Number

COMMON QUARTERLY EXAMINATION - 2024 - 25

Time Allowed : 3.00 Hours] PHYSICS [Max. Marks : 70

PART-I

I. **Choose the correct answer.** 15x1=15

1. An electric dipole is placed at an alignment angle of 30°. with an electric field of 2×10^5 NC^{-1}. It experiences a torque equal to 8 Nm. The charge on the dipole it the dipole length is 1 cm is
   a) 4 mc b) 8 mc c) 5 mc d) 7 mc
2. 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
3. If the length of a wire is doubled and its cross section is also doubled, Then its resistance wire.
   a) becomes 4 times b) become ¼ c) becomes 2 times d) remain unchanged
4. The speed of light in an Isotropic medium depends on
   a) Its intensity b) Its wave length
   c) The native of Propagation d) The motion of the source w.r.t medium
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. Which of the following is an Electromagnetic Wave.
   a) α - rays b) β - rays c) γ - rays d) all of them
7. A circular loop has radius R and a current I flows through it. Another circular loop has radius 2R and a current 2I flows through it. Ratio of the magnetic fields at their centres is
   a) ¼ b) 1 c) 2 d) 4
8. To get three images of a single object one should have two plane mirrors at an angle of
   a) 60° b) 90° c) 120° d) 30°
9. The flux linked with a coil at any instant t is given by $\phi_B = 10t^2 - 50t + 25$. The induced emf at t = 3 sec is
   a) -190 V b) -10V c) 10 V d) 190 V
10. Consider an electric charge oscillating with frequency of 10 MHZ. The radiation emitted will have a wave length equal to
    a) 20 m b) 30 m c) 40 m d) 10 m
11. The toaster operating at 240 V has a resistance of 120Ω. Its power is
    a) 400 W b) 2 W c) 480 W d) 240 W
12. The electric field in the region between two concentric charged spherical shells.
    a) is zero b) increases with distance from centre
    c) decreases with distance from centre d) is constant
13. 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 Am^2 b) 1.2 Am^2 c) 0.5 Am^2 d) 0.8 Am^2
14. In a step down transformer the input voltage is 22 KV and the output voltage is 550 V. The ratio of the number of turns in the secondary to that in the primary is
    a) 1 : 20 b) 20 : 1 c) 1 : 40 d) 40 : 1
15. For light incident from air on a slab of refractive index 2, The maximum possible angle of refraction is
    a) 30° b) 45° c) 60° d) 90°

PART - II

II. Answer Any SIX of The Following. (Answer Question No. 24 Compulsory) **6x2=12**

16. What is Corona Discharge?
17. Compute the magnitude of the magnetic field of a long straight wire carrying a current of 1A at distance of 1m from it.
18. Give two uses of IR Radiation.
19. Define : Electrical Resistivity.
20. The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25. Compute the refractive index of the medium.
21. Why are dish antennas curved?
22. Define : Q - Factor.
23. State Ampere's Circuital law.
24. The Angle of minimum deviation for an equilateral prism is 37°. Find the refractive index of the material of the prism.

PART - III

III. Answer Any SIX of The Following. (Answer Question No.33 Compulsory) **6x3=18**

25. Derive the relation between F and R for a Spherical mirror.
26. How is a Galvanometer converted into an Ammeter.
27. Calculate the electric flux through the rectangle of side 5cm and 10 cm kept in the region of a uniform electric field 100 NC^{-1}. The angle θ is 60° . If θ becomes zero, what is the electric flux?
28. Prove that the total energy is conserved during LC Oscillations.
29. The resistance of a wire is 20Ω. What will be new resistance, If it is stretched uniformly 8 times its original length.
30. Mention the properties of Electro Magnetic Waves.
31. Obtain the expression for energy stored in the parallel plate capacitor.
32. How the emf of two cells are compared using Potentiometer.
33. Determine the self - inductance of 4000 turn air - core solenoid of length 2m and diameter 0.04m.

PART - IV

IV. Answer ALL Questions. **5x5=25**

34. a) Describe the Fizeau's method to determine the speed of light.

(OR)

b) Derive the equation for Refraction at single spherical surface.

35. a) State Gauss law. Obtain the expression for electric field due to an infinitely long charged wire.

(OR)

b) Derive an expression for Electro static potential due to an Electric Dipole.

36. a) Show that the mutual inductance between two long co - axial solenoid is same. ($M_{12} = M_{21}$)

(OR)

b) Find out the phase relationship between Voltage and Current in AC circuit containing only a capacitor.

37. a) Explain cells in Series and Parallel Connection.

(OR)

b) Explain the determination of the Internal Resistance of a cell using Voltmeter.

38. a) Obtain a relation for the magnetic field at a point along the axis of a circular coil carrying current using Biot - Savart law.

(OR)

b) Explain the types of Absorption Spectrum.