

QUARTERLY EXAMINATION - 2022

Register Number

Maximum Marks : 70

XII - PHYSICS

Time Allowed : 3.00 Hours

INSTRUCTIONS : 1.

2.

Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately. Use **Blue** or **Black** ink to write and underline and **Pencil** to draw diagrams.

PART - I

(15×1=15)

Note

i)

Answer **all** the questions.

ii)

Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

- An electric field $\vec{E} = 10x\hat{i}$ 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 $x = 2\text{m}$ is _____
a) 10V b) -20V c) +20V d) -10V
- Two metallic spheres of radii 1cm and 3cm are given charges of $-1 \times 10^{-2}\text{C}$ and $5 \times 10^{-2}\text{C}$ respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is _____
a) $3 \times 10^{-2}\text{C}$ b) $4 \times 10^{-2}\text{C}$ c) $1 \times 10^{-2}\text{C}$ d) $2 \times 10^{-2}\text{C}$
- A 100W, 200V bulb is connected to a 160V power supply. The power consumption would be _____
a) 125W b) 100W c) 80W d) 64W
- 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
- 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) q/m b) 2q/m c) q/2m d) q/4m
- A circular coil of radius 5cm and 50 turns carries a current of 3 ampere. The magnetic dipole moment of the coil is nearly _____ Am^2
a) 1.0 b) 1.2 c) 0.5 d) 0.8
- Above Curie temperature
a) a ferromagnetic substance becomes para magnetic
b) a para magnetic substance becomes diamagnetic
c) a diamagnetic substance becomes paramagnetic
d) a paramagnetic substance becomes ferromagnetic
- The reactance of a capacitor of capacitance is X_c . If both the frequency and capacitance are doubled, then the new reactance will be _____
a) the same as before b) doubled c) quadrupled d) one fourth
- In a series resonant RLC circuit, the voltage across 100Ω resistor is 40V. The resonant frequency ω is 250 rad/s. If the value of C is $4\mu\text{F}$, then the voltage across L is _____
a) 600 V b) 4000 V c) 400V d) 1V
- When the current changes from +2A to -2A in 0.05s, an emf of 8V is induced in the coil. The coefficient of self-induction of the coil is _____ H
a) 0.2 b) 0.4 c) 0.8 d) 0.1
- The unit of electric flux is _____
a) Vm b) NC^{-1}m c) Nm^2C d) $\text{C}^2\text{N}^{-1}\text{m}^{-2}$
- In an electromagnetic wave travelling in free space the rms value of the electric field is 3Vm^{-1} . The peak value of the magnetic field is _____
a) $1.414 \times 10^{-8}\text{T}$ b) $1 \times 10^{-8}\text{T}$ c) $2.828 \times 10^{-8}\text{T}$ d) $2 \times 10^{-8}\text{T}$

13. Which of the following is NOT true for electromagnetic waves?
 a) it transports energy
 b) it transports momentum
 c) it transports angular momentum
 d) in vacuum, it travels with different speeds which depend on their frequency
14. Stars twinkle due to
 a) reflection
 b) total internal reflection
 c) refraction
 d) polarization
15. In Young's double slit experiment the distance between the two slits is doubled. In order to get the same band width, how the distance between slit and screen should be altered?
 a) $2D$
 b) $D/2$
 c) $\sqrt{2}D$
 d) $\frac{D}{\sqrt{2}}$

(6x2=12)

PART- II**Question Number 24 is compulsory.**

- Answer any **six** questions. Question Number 24 is compulsory.
16. What is electric dipole moment? Give its unit.
17. Distinguish between drift velocity and mobility.
18. Two materials X and Y are magnetized whose values of intensity of magnetization are 500 Am^{-1} and 2000 Am^{-1} respectively. If the magnetizing field is 1000 Am^{-1} , then which one among these materials can be easily magnetized?
19. What are coherent sources?
20. State Fleming's right hand rule.
21. Mention the methods of producing induced emf.
22. What are Fraunhofer lines?
23. What is the reason for reddish appearance of sky during sunset and sunrise?
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 230V AC mains.

PART- III

(6x3=18)

Answer any **six** questions. Question Number 33 is compulsory.

25. Derive an expression for the capacitance of a parallel plate capacitor.
26. Explain equivalent resistance of a series resistor network.
27. How is a galvanometer converted into an ammeter? Explain.
28. How will you induce an emf by changing the area enclosed by the coil?
29. Find the impedance of a series RLC circuit if the inductive reactance, capacitive reactance and resistance are 18Ω , 144Ω and 30Ω respectively. Also calculate the phase angle between voltage and current.
30. Write any six characteristics of electromagnetic waves?
31. Derive the relation between f and R for a spherical mirror.
32. What is total internal reflection? Write the conditions for total internal reflection.
33. An electron moving perpendicular to a uniform magnetic field 0.500 T undergoes circular motion of radius 2.50 mm . What is the speed of the electron?

PART- IVAnswer **all** the questions. Draw diagrams wherever necessary.

(5x5=25)

34. Calculate the electric field due to a dipole on its equatorial plane. (OR)
 Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current.
35. How the emf of two cells are compared using potentiometer? (OR)
 Find the phase relationship between voltage and current in a pure capacitive circuit.
36. Explain the types of absorption spectrum. (OR)
 Describe the Fizeau's method to determine the speed of light.
37. Using Gauss's law, obtain the expression for electric field due to an infinitely long charged wire. (OR)
 Discuss the working of cyclotron in detail.
38. Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle. (OR)
 Obtain lens makers formula and lens formula.