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QUARTERLY EXAMINATION - 2024

CLASS : 12 **PHYSICS** Reg.No :

TIME : 3.00 Hrs. MARKS : 70

PART – I

$15 \times 1 = 15$

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

1. Stars twinkle due to
a) reflection b) refraction c) total internal reflection d) polarization

2. An object is placed in front of a convex mirror of focal length of f and the maximum and minimum distance of an object from the mirror such that the image formed is real and magnified.
a) $2f$ and c b) c and ∞ c) f and O d) None of these

3. A hallow conducting sphere of radius R has a charge +q on its surface. What is the electric potential within the sphere at a distance $\frac{R}{3}$ from its center?
a) *zero* b) $\frac{1}{4\pi\varepsilon_o}\frac{3q}{R}$ c) $\frac{1}{4\pi\varepsilon_o}\frac{q}{R}$ d) $\frac{1}{4\pi\varepsilon_o}\frac{9q}{R^2}$

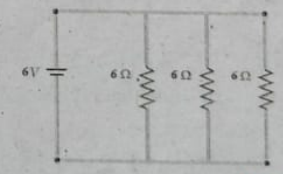
4. A thin insulated wire forms a plane spiral of N = 100 tight turns carrying a current I = 8 mA (milli ampere). The radii of inside and outside turns are a = 50 mm and b = 100 mm respectively. The magnetic induction at the center of the spiral is
a) 5 μT b) 7 μT c) 8 μT d) 10 μT

5. If a wire is stretched to four times its length, then the resistivity of the wire will
a) become 4 times b) become $\frac{1}{4}$ times c) become 16 times d) remains the same

6. In Joule's heating law, when I 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

7. When the current changes from +2A to −2A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is
a) 0.2 H b) 0.4 H c) 0.8 H d) 0.1 H

8. What is the current out of the battery?
a) 1 A b) 2 A c) 3 A d) 4 A



9. In an inductor of inductance L = 100 mH a current of I = 10 A is flowing. The energy stored in the inductor is
a) 5 J b) 10 J c) 100 J d) 1000 J

10. Which of the following electromagnetic radiation is used for viewing objects through fog?
a) microwave b) gamma rays c) X- rays d) infrared rays

11. If voltage applied on a capacitor is increased from V to 2V, choose the correct conclusion.
a) Q remains the same, C is doubled b) Q is doubled, C doubled
c) C remains same, Q doubled d) Both Q and C remain same

12. The area enclosed by a hysteresis loop is a measure of
a) retentivity b) susceptibility c) permeability d) energy loss per cycle

13. In an oscillating LC circuit, the maximum charge on the capacitor is Q. The charge on the capacitor when the energy is stored equally between the electric and magnetic fields is
a) $\frac{Q}{2}$ b) $\frac{Q}{\sqrt{3}}$ c) $\frac{Q}{\sqrt{2}}$ d) Q

14. if $\vec{E}$ and $\vec{B}$ represent electric and magnetic field vectors of the electromagnetic wave, then the direction of propagation of electromagnetic wave is along
a) $\vec{E}$ b) $\vec{B}$ c) $\vec{B} \times \vec{E}$ d) $\vec{E} \times \vec{B}$

15. Let $E = E_o \sin(10^6 x - \omega t)$ be the electric field of plane electromagnetic wave, the value of ω is
a) $0.3 \times 10^{-14}\ rad\ s^{-1}$ b) $3 \times 10^{-14}\ rad\ s^{-1}$
c) $0.3 \times 10^{14}\ rad\ s^{-1}$ d) $3 \times 10^{14}\ rad\ s^{-1}$

Kindly Send Me Your Key Answer to Our email id - Padasalai.net@gmail.com

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PART – II

$6 \times 2 = 12$

Answer any six questions. Question no. 24 is compulsory:

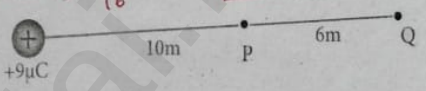
16. Define electric field. Mention its unit.
17. What is Seebeck effect?
18. State Fleming's left hand rule.
19. A capacitor blocks DC but it allows AC. Why?
20. If the resistance of coil is 3 Ω at 20° C and $\alpha = 0.004/^{\circ}C$ then determine its resistance at 100 °C.
21. Mention the conditions to achieve total internal reflection.
22. The coil of a moving coil galvanometer has 5 turns and each turn has an effective area of 2×10^{-2} m^2. It is suspended in a magnetic field whose strength is 4×10^{-2} Wb m^{-2}. If the torsional constant K of the suspension fibre is 4×10^{-9} N m deg^{-1}. Find its current sensitivity
23. What is displacement current?
24. If the focal length is 150 cm for a lens, what is the power of the lens?

PART – III

$6 \times 3 = 18$

Answer any six questions. Question no. 32 is compulsory:

25. Obtain the expression for capacitance for a parallel plate capacitor.
26. Explain equivalent resistance of parallel resistor network.
27. List out the properties of electromagnetic waves.
28. Calculate the electric potential at points P and Q as shown in the figure.



29. How will you induce an emf by changing the area enclosed by the coil?
30. A copper wire of 10^{-6} m^2 area of cross section, carries a current of 2 A. If the number of free electrons per cubic meter in the wire is 8×10^{28}, calculate the current density and average drift velocity of electrons.
31. Differentiate Coulomb's law and Biot-Savart's law.
32. 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 V AC mains. The secondary is given to a load of resistance 10^4 Ω. Calculate the power delivered to the load.
33. Obtain the relation between focal length (f) and radius of curvature (R) of the spherical mirror.

PART – IV

$5 \times 5 = 25$

Answer all the questions:

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

(Or)

b) (i) State Coulomb's law in electrostatics.
(ii) Deduce Gauss law from Coulomb's law.

35. a) Explain the working of Cyclotron in detail.

(Or)

b) Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle.

36. a) Calculate the electric field due to an electric dipole on its axial line.

(Or)

b) Using Ampere's law, obtain an expression for magnetic field due to the current carrying wire of infinite length.

37. a) Derive an expression for phase angle between the applied voltage and current in a series RLC circuit.

(Or)

b) Obtain Lens maker formula and mention its significance.

38. a) What is emission spectrum? Explain the types of emission spectrum.

(Or)

b) (i) Derive the equation for angle of deviation produced by a prism.
(ii) A monochromatic light is incident on an equilateral prism at an angle 30° and is emergent at an angle of 75°. What is the angle of deviation produced by the prism?

Kindly Send Me Your Key Answer to Our email id - Padasalai.net@gmail.com