

FIRST REVISION TEST - 2024

STANDARD - XII

Reg. No.

12B241

Time : 3.00 Hrs.

PHYSICS

Marks : 70

PART - I

Answer ALL the questions.

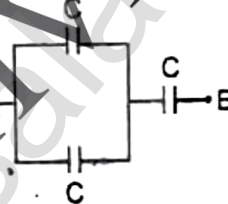
15 X 1 = 15

Choose the correct answer:

1. The radius of curvature of curved surface at a thin planoconvex lens is 10 cm and the refractive index is 1.5. If the plane surface is silvered, then the focal length will be
- a) 20 cm b) 10 cm c) 5 cm d) 15 cm

2. The resultant capacitance of the following circuit between A and B is

- a) 3 C b) $\frac{3}{2}$ C
- c) $\frac{1}{3}$ C d) $\frac{2}{3}$ C



3. The power factor at the resonance of an RLC circuit is

- a) zero b) 0.5 c) 1 d) 0.25

4. If $E = E_0 \sin(10^6 x - \omega t)$ be the electric field of a plane electromagnetic wave, the value of ω is

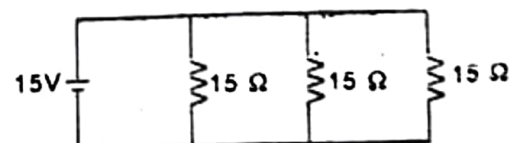
- a) $3 \times 10^{14} \text{ rad s}^{-1}$ b) $0.5 \times 10^{14} \text{ rad s}^{-1}$ c) $5 \times 10^4 \text{ rad s}^{-1}$ d) $0.3 \times 10^4 \text{ rad s}^{-1}$

5. The wavelength of a light is 450 nm. How much phase it will differ for a path of 3 mm?

- a) $\frac{\pi}{75} \times 10^6 \text{ rad}$ b) $\frac{\pi}{150} \times 10^6 \text{ rad}$ c) $\frac{\pi}{45} \times 10^6 \text{ rad}$ d) $\frac{\pi}{50} \times 10^6 \text{ rad}$

6. What is the current drawn out from the battery?

- a) 1 A b) 2 A
- c) 0.1 A d) 3A



7. A particle having mass m and charge q accelerated through a potential difference V . Find the force experienced when it is kept under perpendicular magnetic field \vec{B} is

- a) $\sqrt{\frac{2q^3BV}{m}}$ b) $\sqrt{\frac{q^3B^2V}{2m}}$ c) $\sqrt{\frac{2q^3B^2V}{m}}$ d) $\sqrt{\frac{2q^3BV^2}{m}}$

First.R.-XII-(Physics)

2

8. In a large building there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1 KW are connected. The voltage of electric mains is 220 V. The maximum capacity of the main fuse of the building will be
 a) 12 A b) 10 A c) 8 A d) 14 A
9. A ray of light travelling in a transparent medium of refractive index n falls, on a surface separating the medium from air at an angle of incidence of 45° . The ray can undergo total internal reflection for the following n ,
 a) 1.25 b) $n = 1.5$ c) $n = 1.33$ d) 1.44
10. In an electrical circuit R, L, C and AC voltage source are all connected in series. When L is removed from the circuit, the phase difference between the voltage and current is $\frac{\pi}{3}$. Instead, if C is removed from the circuit, the phase difference is again $\frac{\pi}{3}$. The power factor of the circuit is
 a) $\sqrt{2}$ b) $\frac{1}{\sqrt{2}}$ c) $\frac{1}{2}$ d) 1
11. To obtain coherent sources following techniques are followed. Among them one technique is false. Find the false technique
 a) Wave front division b) Source and image
 c) Phase division d) Intensity division
12. Three balls (i) uncharged (ii) (+ve) charged and (iii) (-ve) charged are thrown with same angle of inclination with same initial speed. If R_0 , $R_{(+)}$ and $R_{(-)}$ are their respective ranges, then
 a) $R_0 = R_{(+)} = R_{(-)}$ b) $R_0 > R_{(+)} > R_{(-)}$
 c) $R_{(+)} > R_0 > R_{(-)}$ d) $R_{(-)} > R_0 > R_{(+)}$
13. Fraunhofer lines are an example of _____ spectrum.
 a) line emission b) band absorption c) band emission d) line absorption
14. The torque on a current carrying coil placed in a magnetic field is maximum when the angle between the plane of the loop and magnetic field is
 a) zero b) 90° c) 180° d) 60°
15. The relation between the average value of an alternating current (I_{av}) and rms value of the current (I_{rms}) is
 a) $I_{rms} = \frac{2\sqrt{2}}{\pi} I_{av}$ b) $I_{rms} = \frac{\pi}{2\sqrt{2}} I_{av}$ c) $I_{rms} = \frac{\sqrt{2}}{\pi} I_{av}$ d) $I_{rms} = \frac{\pi}{\sqrt{2}} I_{av}$

First.R.-XII-(Physics)

3

PART - II

Answer any SIX questions: Question no 24 is compulsory.

6 X 2 = 12

16. What is peltier effect?
17. What is meant by wattless current?
18. A galvanometer of resistance 100Ω gives full scale deflection with 0.01 A current. How much resistance should be connected in parallel to convert it into an ammeter of range 10 A ?
19. State Rayleigh's scattering law.
20. The electric field lines never intersect. Justify.
21. Write and explain Gauss' law in magnetism.
22. What is wave front?
23. How is Eddy current produced? How do they flow in a conductor?
24. Two light sources of equal amplitudes interfere with each other. Calculate the ratio of maximum and minimum intensities.

PART - III

Answer any SIX questions. Question No. 33 is compulsory.

6 X 3 = 18

25. State the applications of capacitors.
26. Explain the motion of a charged particle in a uniform magnetic field.
27. A diffraction grating consists of 4000 slits per centimeter. It is illuminated by a monochromatic light. The second order diffraction maximum is produced at an angle of 30° . What is the wavelength of the light used?
28. Find the equation for the mean value of an alternating current.
29. Discuss the cells in series.
30. Explain the importance of Maxwell's correction.
31. Obtain the equation for Fresnel's distance.
32. Compare para and ferro-magnetism.
33. A $500 \mu\text{H}$ inductor, $\frac{80}{\pi^2} \text{ pF}$ capacitor and a 628Ω resistor are connected to form a series RLC circuit. Calculate the resonant frequency and Q-factor of this circuit at resonance.

First.R.-XII-(Physics)

4

PART - IV

Answer all the questions:

5 X 5 = 25

34. a) Obtain the 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 Maxwell's modification of Ampere's circuital law.

35. a) i) State Joule's law of heating.

ii) An electric heater of resistance 10Ω connected to 220 V power supply is immersed in the water of 1 kg . How long the heater has to be switched on to increase its temperature from 30°C to 60°C .

[Specific heat capacity of water = $4200 \text{ J kg}^{-1} \text{ K}^{-1}$]

(OR)

b) Obtain the equation for Snell's window.

36. a) Explain in detail the effect of dielectric placed in a parallel plate capacitor when the capacitor is disconnected from the battery.

(OR)

b) Discuss the diffraction at a grating and obtain the condition for the m^{th} maximum.

37. a) Explain the working of a single-phase AC generator with necessary diagram.

(OR)

b) Obtain the expression for electric field due to a uniformly charged spherical shell at the point outside the shell.

38. a) i) Explain the theory of a Tangent galvanometer.

ii) A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is $25 \times 10^{-6} \text{ T}$ then, calculate the current which gives a deflection of 60° .

(OR)

b) Assuming that the length of the solenoid is large when compared to its diameter, find the equation for its inductance.

— — Ω — —