

PHYSICS

CLSS:12

REG NO.

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TIME:3.00 Hrs

MARKS: 70

PART-A

NOTE: 1) Answer All Questions.

15 X 1 =15

2) Choose The Correct Answer and Write It with Option.

1. An electric field $\vec{E} = 10x\hat{i}$ exists in a certain region of space. Then the potential difference $V = V_o - V_A$, where V_o is the potential at the origin and V_A is the potential at $x = 2$ m is:

- (a) 10 V (b) -20 V (c) +20 V (d) -10 V

2. What is the value of resistance of the following resistor?



Brown -black-yellow- gold

- (a) 100 k Ω (b) 10 k Ω
(c) 1k Ω (d) 1000 k Ω

3. 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} .

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

4. 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) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{6}$ (d) Zero

5. If the magnetic monopole exists, then which of the Maxwell's equation to be modified?

- (a) $\oint_S \vec{E} \cdot d\vec{A} = \frac{Q_{enclosed}}{\epsilon_0}$ (b) $\oint_S \vec{B} \cdot d\vec{A} = 0$
(c) $\oint_l \vec{B} \cdot d\vec{l} = \mu_0 i_c + \mu_0 \epsilon_0 \frac{d}{dt} \oint_S \vec{E} \cdot d\vec{A}$ (d) $\oint_l \vec{E} \cdot d\vec{l} = - \frac{d}{dt} \phi_B$

6. 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

7. 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) $2D$ (b) $D/2$ (c) $\sqrt{2}D$ (d) $D/\sqrt{2}$

8. In an electron microscope, the electrons are accelerated by a voltage of 14 kV. If the voltage is changed to 224 kV, then the de Broglie wavelength associated with the electrons would

- (a) increase by 2 times (b) decrease by 2 time
(c) decrease by 4 times (d) increase by 4 times

9. Atomic number of H-like atom with ionization potential 122.4 V for $n = 1$ is

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

10. The barrier potential of a silicon diode is approximately,

- a) 0.7 V b) 0.3V c) 2.0 V d) 2.2V

11. The alloys used for muscle wires in Robots are

- (a) Shape memory alloys (b) Gold copper alloys
(c) Gold silver alloys (d) Two dimensional alloys

12. 99% of a radioactive element will decay between

- A) 6 and 7 half lives B) 7 and 8 half lives C) 8 and 9 half-lives D) 9 half lives

13. If voltage across a bulb rated 220V, 100 W drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is

- A) 5% B) 10% C) 20% D) 2.5%

14. In the series LCR circuit the power dissipation is through

- A) R B) L C) C D) Both L and C

15. A moving coil galvanometer has a resistance of 900 Ω . In order to send only 10% of the main current through this galvanometer, the resistance of the required shunt is

- A) 9 Ω B) 100 Ω C) 405 Ω D) 90 Ω

II. Answer Any SIX of The Following.**6 X 2 =12****(Answer Question No.24 Compulsory)**

16. Define 'capacitance'. Give its unit.
17. Define temperature coefficient of resistance.
18. Mention the ways of producing induced emf.
19. Why do stars twinkle?
20. Find the polarizing angles for (i) glass of refractive index 1.5 and (ii) water of refractive index 1.33.
21. How does photocurrent vary with the intensity of the incident light?
22. What is binding energy of a nucleus? Give its expression.
23. Distinguish between Nanoscience and Nanotechnology..
24. Compute the magnitude of the magnetic field of a long, straight wire carrying a current of 1 A at distance of 1m from it. Compare it with Earth's magnetic field.

PART-C**III. Answer Any SIX of The Following.****6 X 3 =18****(Answer Question No.33 Compulsory)**

25. Derive an expression for electrostatic potential due to an electric dipole.
26. A cell supplies a current of 0.9 A through a $2\ \Omega$ resistor and a current of 0.3 A through a $7\ \Omega$ resistor. Calculate the internal resistance of the cell.
27. Give an account of magnetic Lorentz force.
28. Define inductive and capacitive reactance. Give their units.
29. Obtain the equation for apparent depth.
30. Discuss about Nicol prism.
31. List out the characteristics of photons.
32. Give the symbolic representation of alpha decay, beta decay and gamma emission.
33. A transmitting antenna has a height of 40 m and the height of the receiving antenna is 30 m. What is the maximum distance between them for line-of-sight communication? The radius of the earth is 6.4×10^6 m.

PART-D**IV. Answer ALL Questions****5X 5 =25**

34. a) Calculate the electric field due to a dipole on its equatorial plane.
(OR)
b) Describe the Fizeau's method to determine the speed of light.
35. a) Explain the equivalent resistance of a series and parallel resistor network.
(OR)
b) Obtain the law of radioactivity.
36. a) Obtain the equation for bandwidth in Young's double slit experiment.
(OR)
b) Explain the construction and working of a full wave rectifier.
37. a) Derive the expression for the force between two parallel, current-carrying conductors.
(OR)
b) Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons.
38. a) Show that the mutual inductance between a pair of coils is same ($M_{12} = M_{21}$).
(OR)
b) Explain the types of emission spectrum.

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