Dr. A. Vanila, Principal Kumbakonam - Thanjavur District

HYM

HALF YEARLY EXAMINATION - 2024

12 - Std **PHYSICS**

Time : 3.00 hrs. Marks : 70

PART- A

Choose the correct answer and write it with option : 15 x 1 = 15

1. 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 m is:
   (a) 10 V (b) –20 V (c) +20 V (d) –10 V
2. Van dee Graff Generator is used to produce potential difference of
   (a) 10^4 V (b) 10^{-4} V (c) 10^7 V (d) 10^{-7} V
3. 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
4. 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 A m^2 (b) 1.2 A m^2 (c) 0.5 A m^2 (d) 0.8 A m^2
5. S.I unit of magnetic flux is
   (a) Wb m^{-2} (b) T (c) Wb m (d) T m^2
6. Fraunhofer lines are an example of _____ spectrum.
   (a) line emission (b) line absorption (c) band emission (d) band absorption
7. If the velocity and wavelength of light in air is Va and λa and that in water is Vw and λw, then the refractive index of water is,
   (a) $\frac{V_w}{V_a}$ (b) $\frac{V_a}{V_w}$ (c) $\frac{\lambda_a}{\lambda_w}$ (d) $\frac{V_a}{V_w}\frac{\lambda_a}{\lambda_w}$
8. A ray of light strikes a glass plate at an angle 60°. If the reflected and refracted rays are perpendicular to each other, the refractive index of the glass is,
   (a) $\sqrt{3}$ (b) $\frac{3}{2}$ (c) $\sqrt{\frac{3}{2}}$ (d) 2
9. The wavelength λe of an electron and λp of a photon of same energy E are related by
   (a) $\lambda p \propto \lambda e$ (b) $\lambda p \propto \sqrt{\lambda e}$ (c) $\lambda p \propto \frac{1}{\sqrt{\lambda e}}$ (d) $\lambda p \propto \lambda_e^2$
10. The ratio between the first three orbits of hydrogen atom is
    (a) 1:2:3 (b) 2:4:6 (c) 1:4:9 (d) 1:3:5
11. If the input to the NOT gate is A = 1100, its output is
    (a) 0100 (b) 1000 (c) 1100 (d) 0011
12. The technology used for stopping the brain from processing pain is
    (a) Precision medicine (b) Wireless brain sensor
    (c) Virtual reality (d) Radiology
13. Binding energy of Helium nucleus is 28.33Mev. Binding energy per nucleon of Helium nucleus is
    (a) 14.16 Mev (b) 7 Mev (c) 7.8Mev (d) 14Mev

14. _____nature of electron is used in the construction of electron microscope
(a) Dual nature (b) particle nature (c) wave nature (d) quantum nature

15. A step-down transformer reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A. Then its efficiency is
(a) 1.2 (b) 0.83 (c) 0.12 (d) 0.9

PART-B

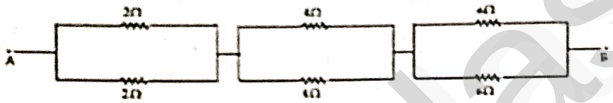
Answer any SIX questions and Question No.19 is compulsory. 6 X 2 = 12

16. Define electric flux. Give it's unit.
17. Why nichrome is used as heating element in electric heaters?
18. Define curie's law.
19. Prove the Boolean identity AC+ABC = AC.
20. What are the properties of Nuclear force.
21. Distinguish between Nanoscience and Nanotechnology.
22. Define stopping potential.
23. What is dispersion?
24. Write a notes on Gauss's law in magnetism.

PART - C

Answer any SIX questions and Question No. 29 is compulsory. 6 x 3 = 18

25. Derive an expression for capacitance of parallel plate capacitor.
26. Calculate the equivalent resistance between A and B in the given circuit.



27. Write a short notes on (1) X - ray (2) micro waves.
28. How is a galvanometer converted into an ammeter?
29. A 400 mH coil of negligible resistance is connected to an AC circuit in which an effective current of 6 mA is flowing. Find out the voltage across the coil if the frequency is 1000 Hz.
30. Discuss about Nicol prism.
31. Give the application of photocells.
32. Explain Alpha decay and beta decay.
33. State De Morgan's theorems.

PART-D

Answer all Questions : 5 x 5 = 25

34. a) Calculate the electric field due to a dipole on its equatorial plane. **(OR)**
b) Explain about compound microscope and obtain equation for magnification.

35. a) Derive the mirror equation and the equation for lateral magnification. **(OR)**
b) How the emf of two cells are compared using potentiometer?

36. a) Obtain an expression for magnetic field due to long current carrying solenoid.
(OR) b) Give the construction and working of photo emissive cell.

37. a) What is absorption spectra?. Explain their types. **(OR)**
b) Explain J. J. Thomson experiment to determine specific charge.

38. a) Draw the circuit diagram of a half wave rectifier and explain it's working. **(OR)**
b) Find out the phase relationship between voltage and current in a pure inductive circuit.