12 P

Register No. 12A08

Time : 3.00 Hrs.

Half-Yearly Examination - 2023

PHYSICS

Marks : 70

PART - I

NOTE: Answer all questions: **(15x1=15)**

1. A Parallel plate capacitor stores a charge Q at a voltage V. Suppose the area of the parallel plate capacitor and distance between the plates are each doubled then which is the quantity that will change?
   a) Voltage b) Capacitance c) Energy density d) Charge.
2. A toaster operating at 240V has a resistance of 120Ω Its power is
   a) 400W b) 2 W c) 480 W d) 240 W
3. An example of Diamagnetic material is ———a) Nickel b) Water c) Aluminium d) Iron
4. In a transformer, the number of turns in the primary and the secondary coils are 410 and 1230 respectively. If the current in the primary coil is 6A, then that in the secondary coil is
   a) 2A b) 18A c) 12A d) 1A
5. Which of he following is false for electromagnetic waves?
   a)transverse b) non mechanical waves c) longitudinal d) produced by accelerating charges.
6. If the velocity and wavelength of light in air is V_a and λ_a and that in water is V_w and λ_w, then the refractive index of water is, a) $\frac{V_a}{V_w}$ b) $\frac{V_w}{V_a}$ c) $\frac{\lambda_w}{\lambda_a}$ d) $\frac{V_a\lambda_a}{V_w\lambda_w}$
7. Two coherent monochromatic light beams of intensities I and 4I are super posed. The maximum and minimum possible intensities in the resulting beam are
   a) 5I and I b) 5I and 3I c) 9I and 3I d) 9I and I
8. The given electrical network is equivalent to

   a) AND Gate b) OR Gate c) NOR Gate d) NOT Gate.
9. "Ski wax" is an application of nano product in the field of
   a) Medicine b) Textile c) Sports d) Automotive industry
10. If the mean wavelength of light from sun is taken to be 550 nm and its mean power is 3.8×10^{26} W. The number of photons received by the human eye per second on the average from sunlight is of the order of a) 10^{45} b) 10^{42} c) 10^{54} d) 10^{51}
11. A system consists of No nucleus at t=0. The number of nuclei remaining after half of a half-life (ie.at time t = ½. T½)
    a) $\frac{N_o}{2}$ b) $\frac{N_o}{\sqrt{2}}$ c) $\frac{N_o}{4}$ d) $\frac{N_o}{8}$
12. Which one of the following is a natural nanomaterial.
    a) Peacock feather b) Peacock beak c) Grain of sand d) Skin of the whale.
13. Stars twinkle due to a) reflection b) total internal reflection c) refraction d) polarization
14. Brakhausen condition for maintenance of oscillation is
    a) $\beta = \frac{1}{A}$ b) $A = \alpha$ c) $A = \beta$ d) $A\beta = \frac{1}{\sqrt{2}}$

15. Which of the following will deflect in an electric field?
a) X-rays b) Gamma rays c) Cathode rays d) UV rays.

PART - II

Answer any six questions. Question No.24 is compulsory. **6 x 2 = 12**

16. Define "electric field".
17. How will you increase the current sensitivity of a galvanometer?
18. Mention the ways to produce induced emf in a closed circuit.
19. Write the uses of Infra-red rays.
20. Define – Curie
21. What is doping?
22. Define threshold frequency.
23. Calculate the Speed of light which travels in pure water of refractive index 1.33.
24. If the resistance of coil is 10Ω at 0°C and $\alpha = 0.004$ / °C then, determine the resistance at 100°C.

PART - III

Answer any six questions. Question No.33 is compulsory. **6 x 3 = 18**

25. Obtain the resultant capacitance of capacitors connected in series.
26. Explain the conversion of galvanometer into voltmeter.
27. Obtain the relation between current and drift velocity.
28. What are the applications of photo cells.
29. Calculate the Self Inductance of a air-core coil of length 2m, 0.04m diameter and having 4000 turns.
30. What are the uses of polaroids?
31. Write down the properties of electromagnetic waves.
32. Obtain the expression for Apparent depth.
33. $_{92}U^{235}$ nucleus emits 2α particles, 3β particles and 2γ particles. What is the resulting atomic number and mass number?

PART - IV

Answer all the questions. **5 x 5 = 25**

34. a) Derive an expression for electrostatic potential due to an electric dipole. **(OR)**
b) Obtain the lens maker's formula and mention its significance.
35. a) How will you determine the internal resistance of a cell using voltmeter? **(OR)**
b) (i) Write a note on characteristic X-ray spectra.
(ii) Calculate the cut off wavelength and cut off frequency of X-rays from a X-ray tube which is accelerated by a potential of 20,000V.
36. a) Using Biot-savart law deduce the relation for the magnetic field at a point due to an infinite long straight conductor carrying current. **(OR)**
b) Obtain the expression for bandwidth in young's double slit experiment.
37. a) Explain the principle, construction and working of a transformer. **(OR)**
b) Obtain the Law of radioactivity. (with graph)
38. a) Write down Maxwell equations in integral form **(OR)**
b) State and prove De Morgan's first and second theorem.