RM

FIRST REVISION TEST - 2023

XII - Std

PHYSICS

Madurai

Time : 3.00 Hrs

Marks : 70

PART - A

i. Answer all questions. ii. Choose the correct answer :-   15 x 1 = 15

1. An electric dipole is placed at an alignment angle of 30o with an electric field of 2×10^5 N C^{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if the dipole length is 1 cm is
   (a) 4 mC
   (b) 8 mC
   (c) 5 mC
   (d) 7 mC

2. The electric field is zero inside the conductor, the electrostatic potential on the surface and inside the conductor.
   (a) greater
   (b) lower
   (c) same
   (d) zero

3. Two wires of A and B with circular cross section are made up of the same material with equal lengths. Suppose $R_A = 3 R_B$, then what is the ratio of radius of wire A to that of B?
   (a) 3
   (b) $\sqrt{3}$
   (c) $\dfrac{1}{\sqrt{3}}$
   (d) $\dfrac{1}{3}$

4. In India electricity is supplied for domestic use at 220 V. It is supplied at 110 V in USA. If the resistance of a 60W bulb for use in India is R, the resistance of a 60W bulb for use in USA will be
   (a) R
   (b) 2R
   (c) $\dfrac{R}{4}$
   (d) $\dfrac{R}{2}$

5. Bohr magneton which is used to measure _____
   (a) atomic magnetic moments
   (b) magnetic moments
   (c) angular momentum
   (d) orbit number

6. 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) $\dfrac{\pi}{4}$
   b) $\dfrac{\pi}{2}$
   c) $\dfrac{\pi}{6}$
   d) zero

7. The flux linked with a coil at any instant t is given by $\phi_B = 10t^2 - 50t + 250$. The induced emf at t = 3 s is
   (a) −190 V
   (b) −10 V
   (c) 10 V
   (d) 190 V

8. Unit for $\left(\mu_O \varepsilon_O\right)^{\frac{-1}{2}}$
   a) Pa
   b) Nm^{-1}
   c) ms^{-1}
   d) kGm^{-1}

9. Light travels from air into a glass slab of thickness 50 cm and refractive index 1.5. What is the speed of light in the glass slab?
   a) 2 X 10^8 ms^{-1}
   b) 2 X 10^{-8} ms^{-1}
   c) 2.5 X 10^{-9} ms^{-1}
   d) 2.5 X 10^9 ms^{-1}

10. First diffraction minimum due to a single slit of width $1.0 \times 10-5$ cm is at 30o. Then wavelength of light used is,
    (a) 400 Å
    (b) 500 Å
    (c) 600 Å
    (d) 700 Å

11. A graph between maximum K.E of photoelectrons and frequency of the incident light gives
    (a) parabola
    (b) straight line
    (c) circle
    (d) elipse

12. 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 times
    (c) Decrease by 4 times
    (d) increase by 4 times

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13. Mp denotes the mass of the proton and Mn denotes mass of a neutron. A given nucleus of binding energy B, contains Z protons and N neutrons. The mass M(N,Z) of the nucleus is given by(where c is the speed of light)

a) $M(N, Z) = NM_n + ZM_p - Bc^2$
b) $M(N, Z) = NM_n + ZM_p + Bc^2$
c) $M(N, Z) = NM_n + ZM_p - B/c^2$
d) $M(N, Z) = NM_n + ZM_p + B/c^2$

14. The zener diode is primarily used as

(a) Rectifier (b) Amplifier (c) Oscillator (d) Voltage regulator

15. The blue print for making ultra durable synthetic material is mimicked from

(a) Lotus leaf (b) Morpho butterfly (c) Parrot fish (d) Peacock feather

PART - B

Answer any SIX questions and Question No. 17 is compulsory :- 6 x 2 = 12

16. Define electric flux.
17. Determine the number of electrons flowing per second through a conductor, when a current of 32 A flows through it.
18. State Fleming's left hand rule.
19. Mention the ways of producing induced emf.
20. Explain the reason for the glittering of diamond.
21. Differentiate between Fresnel and Fraunhofer diffraction.
22. What is half-life of a radioactive nucleus? Give the expression.
23. List the applications of light emitting diode.
24. Define stopping potential.

PART - C

Answer any SIX questions and Question No. 27 is compulsory :- 6 x 3 = 18

25. Explain the equivalent resistance of a parallel resistor network.
26. Discuss the conversion of galvanometer into a voltmeter.
27. Find the (i) angular momentum (ii) velocity of the electron revolving in the 5th orbit of hydrogen atom. ($h = 6.6 \times 10^{-34}$ Js, $m = 9.1 \times 10^{-31}$ kg).
28. Mention the energy losses in a transformer.
29. Write a short note on microwave and x-ray.
30. Obtain the equation for apparent depth.
31. Discuss about pile of plates.
32. How do we obtain characteristic x-ray spectra?
33. Explain the sky wave propagation of electromagnetic waves through space.

PART - D

Answer all questions :- 5 x 5 = 25

34. a) Derive an expression for electrostatic potential due to an electric dipole. *(OR)*
b) Discuss about Diffraction in single slit.

35. a) Explain the determination of the internal resistance of a cell using voltmeter. *(OR)*
b) Describe the Fizeau's method to determine the speed of light.

36. a) Derive the expression for the force on a current-carrying conductor in a magnetic field.
(OR) b) Describe briefly Davisson – Germer experiment which demonstrated the wave nature of electrons.

37. a) Explain the construction and working of a single-phase AC generator with necessary diagram.
(OR) b) Derive the radius expression for an electron in the nth orbit using Bohr atom model.

38. a) Explain the types of absorption spectrum. *(OR)*
b) What is rectification? Explain the construction and working of a full wave rectifier.

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