1108-A

PHYSICS – P1

Time : 3 Hours] **[Maximum Marks : 70**

Note:- **"Attempt any 60 Marks out of 70 Marks".**

SECTION-A

(1 mark each)

1. (i) Electric field due to a point charge is :

(a) Spherically symmetric

(b) Cylindrically symmetric

(c) Asymmetric

(d) None of the above

(ii) Electric Potential V at a point at distance r from point charge q is proportional to

(a) $\frac{q}{r^2}$

(b) $\frac{q^2}{r}$

(c) $\frac{q}{r}$

(d) $\frac{q^2}{r^2}$

(iii) Current sensitivity of a galvanometer can be increased by decreasing.

(a) Magnetic field

(b) No of turns

(c) Torsional constant

(d) Area

(iv) An emf of 200 V is induced in a circuit when current in circuit falls from 5A to 0A in 0.15 sec. The self-inductance of the circuit is :

(a) 3.5 H

(b) 3.9 H

(c) 4 H

(d) 4.2 H

(v) If $\vec{E}$ & $\vec{B}$ represent electric and magnetic field vectors of an electromagnetic wave the direction of propagation of wave is along

(a) $\vec{E}$

(b) $\vec{B}$

(c) $\vec{B} \times \vec{E}$

(d) $\vec{E} \times \vec{B}$

(vi) The type of wavefront that emerges from a distant light source is

(a) Converging spherical

(b) Diverging spherical

(c) Plane

(d) Cylindrical

(vii) What is the refractive index of a medium in which light travels with speed of 2×10^8 m/s?

(a) $\frac{3}{2}$

(b) $\frac{2}{3}$

(c) 1

(d) None of these

(viii) In photoelectric effect if both the intensity and frequency are doubled then saturation current :

(a) Remains constant

(b) is Halved

(c) is doubled

(d) Become Four times

(ix) The series of Hydrogen spectrum which lies in visible region of spectrum is

(a) Lyman series (b) Balmer series

(c) Paschen series (d) None of the above

(x) A P-type semiconductor is obtained by doping Silicon with

(a) Germanium (b) Gallium

(c) Bismuth (d) Phosphorus

SECTION-B

(2 marks each)

2. What is the force between two small charged spheres having charges of 2×10^{-7} C and 3×10^{-7} C placed 30cm apart in air?

3. Why two electric field lines cannot intersect each other?

4. Define conductance and conductivity.

5. Give some limitations of Ohm's Law.

6. What are important uses of ultraviolet rays and X-rays?

7. What is the focal length of equivalent of a convex lens of focal length 30cm which is in contact with a concave lens of focal length 20cm? Is system Converging or Diverging?

8. What are coherent and incoherent sources of light?

9. Define distance of closest approach and Impact Parameter.

10. What are nuclear forces? Give its important properties.

SECTION-C

(3 marks each)

11. Explain Coulomb's law in vector form.

12. Derive expression for Torque experienced by a current loop (rectangular) in external uniform magnetic field.

13. State and explain Kirchhoff's voltage law.

14. State Lenz's Law? Prove that it is in accordance with law of conservation of Energy?

15. Define Total Internal Reflection? State its conditions and hence define critical angle.

16. Explain Laws of Photoelectric effect on the basis of Einstein's photoelectric equation.

17. Write three postulates of Bohr's model of atom.

18. What is PN Junction Diode? Explain the formation of Depletion region in a PN Junction diode?

19. Draw the circuit diagram of PN Junction diode as a full wave-Rectifier. Explain its working.

SECTION-D

(5 marks each)

20. Using Biot-Savart's law, Derive an expression for magnetic field due to a circular current carrying coil at a point on axis of coil passing through its centre.

OR

What is meant by magnetic dipole moment? Derive an expression for magnetic field Intensity due to a magnetic dipole at a point on its equatorial line.

21. Derive an expression for the impedance of an A.C circuit containing a Resistor, Inductor and a capacitor ie (RLC circuit) in series with the help of phasor.

OR

Discuss in detail principle, construction and working of AC generator.

Draw its labelled diagram.

Turn Over

22. Derive Lens Makers formula for a convex Lens. Write necessary sign conventions used in deriving it.

OR

Derive laws of reflection/refraction using Huygen's principle of wave fronts.

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