

**CBSE GUIDE**  
**SAMPLE PAPER-02**  
**PHYSICS (Theory)**  
**(Questions)**

Time allowed: 3 hours

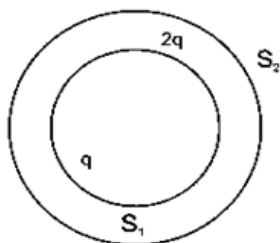
Class – XII

Maximum Marks: 70

**General Instructions:**

- All questions are compulsory.
- Questions 1 to 5 are one mark questions.
- Questions 6 to 10 are two marks questions.
- Questions 11 to 22 are three marks questions.
- Question 23 is four marks question.
- Question 24 to 26 are five marks questions.
- There is no overall choice in the question paper, but internal choice is there.
- Use of calculator is not permitted.

- 
- What is the basic cause of quantization of charges?
  - What are thermal neutrons?
  - What is the dimensional formula of  $\sqrt{LC}$  ?
  - Give example of  $\beta$  decay.
  - A converging lens of refractive index 1.5 is kept in a liquid having same refractive index. What would be power of lens in this medium?
  - $S_1$  and  $S_2$  are two hollow concentric spheres enclosing charges  $q$  and  $2q$  respectively.
    - What is the ratio of electric flux through  $S_1$  and  $S_2$
    - How will the electric flux through sphere  $S_1$  change if a medium of dielectric constant 5 is introduced in the sphere  $S_1$  in place of air?



- Distinguish between paramagnetic, diamagnetic and ferromagnetic material.
- State the laws of photoelectric effect. Explain it on the basis of Einstein equation.
- Draw the graph showing the variation of inductive reactance and capacitive reactance with frequency of applied a.c. voltage source.
- The oscillating electric field of an electromagnetic wave is given by  $E_y = 30 \sin (2 \times 10^{11}t + 300\pi x) \text{ Vm}^{-1}$ . Find the direction of propagation of wave and write down the expression for magnetic field?

11. A circular coil of radius 8cm and 20 turns rotates about its vertical diameter with an angular speed of  $50\text{s}^{-1}$ . In uniform horizontal magnetic fields of magnitude  $30 \times 10^{-2}\text{T}$ . find the maximum and average value of emf induced in the coil?
12. Draw a schematic arrangement of Geiger Marsden experimental setup. How does it explain the size of nucleus?
13. Why is electrostatic potential constant throughout the volume of the conductor and has the same value (as inside) on its surface?
14. Why a voltmeter is always connected in parallel with a circuit element across which voltage is to be measured?

**Or**

A proton and an alpha particle having the same kinetic energy are allowed to pass through a uniform magnetic field perpendicular to their direction of motion. Compare the radii of the paths of proton and alpha particle

15. The work function for the surface of aluminium is 4.2 eV. How much potential difference will be required to stop the emission of maximum energy electrons emitted by the light of  $2000 \text{ \AA}$  wavelength? What will be the wavelength of that incident light for which stopping potential will be zero? Given that  $h = 6.6 \times 10^{-34} \text{ Js}$ ,  $c = 3 \times 10^8 \text{ m/s}$
16. Write down the six properties of electric field lines.
17. Derive an expression for the electric field intensity due to two thin infinite parallel sheets of charge.
18. (a) Define current density and conductance.  
(b) Derive the relation between current density, conductance and electric field.
19. (a) The connecting wires are of copper. Why?  
(b) Calculate the resistivity of the material of wire 1 m long, 0.4 mm in diameter and having resistance of 2 ohm.
20. (a) A transistor does not work in railway carriage. Why?  
(b) A common emitter amplifier is designed with npn transistor ( $\alpha = 0.99$ ). The input impedance is  $1 \text{ k}\Omega$  and load is  $10 \text{ k}\Omega$ . Find the voltage gain and power gain.
21. (a) What do you mean by modulation and demodulation? Explain.  
(b) An audio signal of amplitude 0.1 V is used in amplitude modulation of a carrier wave of amplitude 0.2 V. Calculate the modulation index.
22. (a) Define decay constant.  
(b) The sequence of decay of radioactive nucleus is  $D \xrightarrow{\alpha} D_1 \xrightarrow{\beta} D_2 \xrightarrow{\alpha} D_3 \xrightarrow{\alpha} D_4$   
If nucleon number and atomic number of  $D_2$  are 176 and 71 respectively, what are their values for D and  $D_4$ ?
23. Ram and Shyam went to the trade fair. They were busy in a crowded corner where the balloons were sold. A child was seen troubling his parent and crying for something. On seeing this, Ram went to the child and said that he would perform a trick with balloons. Ram took two balloons and Shyam helped him to inflate and tie. When the balloons were rubbed with the sweater he was wearing, they were attracted. When taken nearer to wall, the balloons got stuck. The child enjoyed and stopped crying.  
(a) Give two values of Ram and Shyam.  
(b) How did the balloons get attracted? Will they repel also?
24. What is de Broglie hypothesis? Derive the formula for de Broglie wavelength.

(b) Find the de Broglie wavelength associated with a hydrogen molecule moving with a thermal velocity of 3km/s.

25. (a) What are features of Rutherford's atom model?

(b) The wavelength of  $K_{\alpha}$  line for copper is  $1.36 \text{ \AA}$ . Calculate the ionization potential of a K shell electron in copper.

26. (a) Explain the distinction between conductors, semiconductor and insulators on the basis of their energy bands.

(b) The number densities of electrons and holes in pure silicon at  $27^{\circ}\text{C}$  are equal and its value is  $2.0 \times 10^{16} \text{ m}^{-3}$ . On doping with indium, the hole density increases to  $4.5 \times 10^{22} \text{ m}^{-3}$ , find the electron density in doped silicon.