

**Sample Paper – 2012**  
**Class – XII**  
**Subject –Physics**

- Q1.** A proton moving in a straight line enters a strong magnetic field along the field line direction. How will its path and velocity change? **(1)**
- Q2.** Sketch a graph to show how the reactance of (i) a capacitor (ii) an inductor varies as function of frequency? **(1)**
- Q3.** Define transformer ratio? **(1)**
- Q4.** A variable frequency a.c. source is connected to a capacitor. Will the displacement current increase or decrease with decrease in frequency?**(1)**
- Q5.** Suppose that the lower half of a concave mirror's reflecting surface is covered with an opaque non-reflecting material. What effect will this have on the image of an object placed in front of the mirror? **(1)**
- Q6.** Draw the graph showing the distribution of kinetic energy of electron emitted during beta decay?**(1)**
- Q7.** Is Ohm's law obeyed in semiconductors or not? **(1)**
- Q8.** When the base current in a transistor is changed from  $30\mu\text{A}$  to  $80\mu\text{A}$ , the collector current is changed from  $1.0\text{mA}$  to  $3.5\text{mA}$ . Find the a.c. current amplification factor?**(1)**
- Q9.** A plastic rod of length  $2.2\text{m}$  and radius  $3.6\text{mm}$  carries a negative charge of  $3.8 \times 10^{-7}\text{C}$  spread uniformly over its surface. What is the electric field near the mid-point of the rod, at a point on its surface? **(2)**
- Q10.** What happens to the drift velocity ( $v_d$ ) of electrons and the resistance  $R$  if the length of the conductor is doubled keeping potential difference unchanged? **(2)**
- Q11.** Give reasons for the following:-
- (a)** Standard resistance coils are made of manganin.
  - (b)** Bending a wire does not affect electrical resistance. **(2)**
- Q12.** A circular coil of 100 turns, radius  $10\text{cm}$  carries a current of  $5\text{A}$ . It is suspended vertically in a uniform horizontal magnetic field of  $0.5\text{T}$ , the field lines making an angle of  $60^\circ$  with the plane of coil. Calculate the magnitude of the torque that must be applied on it to prevent it from turning. **(2)**
- Q13.** Draw a labeled diagram of Hertz's experiment set-up to produce electromagnetic waves. Explain the generation of electromagnetic waves using this set-up. **(2)**
- Q14.** Two lenses of powers  $+15\text{D}$  and  $-5\text{D}$  are in contact with each other forming a combination lens.

- (a) What is the focal length of the combination?  
(b) An object of size 3cm is placed at 30cm from this combination of lenses. Calculate the position and size of the image formed. (2)

**Q15.** A photon and electron have got same de-Broglie wavelength, which has greater kinetic energy? Explain. (2)

**Q16.** A source of light of frequency greater than threshold frequency is placed at distance of 1m from the cathode of a photocell. The stopping potential is found to be V. If the distance of the light source from the cathode is reduced, explain giving reasons, what change will you observe in the

- (a) Photoelectric current  
(b) Stopping potential (2)

**Q17.** Calculate the binding energy per nucleon in case of  ${}_{26}\text{Fe}^{56}$ , given mass of proton=1.007825amu, mass of neutron=1.008665amu and mass of nucleus of  ${}_{26}\text{Fe}^{56}$  is 55.934939amu. (2)

**Q18.** What does the term 'LOS communication' mean? Name the type of waves that are used for this communication. (2)

**Q19.** Two charges  $4\mu\text{C}$  and  $-4\mu\text{C}$  are placed at  $(-3,0,0)$  and  $(3,0,0)$  cm respectively in an external field given by  $E=9\times 10^6/r^2 \text{ Cm}^{-2}$ . Find the energy of the system in this external field. (3)

**Q20.** Derive an expression for the energy stored in a parallel plate capacitor C charged to potential difference V. What is the form of this energy and where from it comes? (3)

**Q21. (a)** The current in a circuit with an external resistance  $R_1$  is  $i_1$ . When the external resistance is  $R_2$ , the current is  $i_2$ . Find the e.m.f. and the internal resistance of the current source.

(b) Can Meter Bridge be used for finding the resistance of moderate values? Explain briefly. (2+1)

**Q22.** How is mutual inductance of a pair of coils affected when:-

- (a) Separation between the coils is increased?  
(b) Number of turns of each coil is increased?  
(c) A thin iron sheet is placed between the two coils, other factors remaining same? Explain your answer. (3)

**Q23.** A  $100\mu\text{F}$  capacitor in series with  $40\Omega$  resistance is connected to a 110V, 60Hz supply.

- (a) What is the maximum current in the circuit?  
(b) What is the time lag between current maximum and voltage maximum?  
(c) Hence explain why capacitor is a conductor at very high frequencies. (3)

**Q24.** State and prove Prism Formula. (3)

**Q25.** What is meant by interference of light? Describe briefly Young's double slit experiment to demonstrate interference of light. (3)

**Q26.** There is a stream of neutrons with a kinetic energy of 0.0327eV. If the half-life of neutrons is 700seconds, what fraction of neutrons will decay before they travel a distance of 10m? Given mass of neutron= $1.675 \times 10^{-27}$ kg. (3)

**Q27.** A T.V. tower has height of 70m.

(1) How much population is covered by the T.V. broadcast if the average population density around the tower is  $1000 \text{ km}^{-2}$ , Radius of earth= $6.4 \times 10^6$ m.

(2) By how much the height of the tower be increased to double its coverage range? (3)

**Q28. (a)** A long solenoid with closely wound turns has  $n$  turns per unit of its length. A steady current  $I$  flow through this solenoid. Use Ampere's circuital law to obtain an expression, for the magnetic field, at a point on its axis and close to its mid-point. (3)

(b) A magnet suspended at  $30^\circ$  with magnetic meridian makes an angle of  $45^\circ$  with the horizontal. What shall be the actual value of the angle of dip? (2)

**Q29. (a)** Discuss the intensity of transmitted light when a Polaroid sheet is rotated between two crossed polaroids.(3)

(b) A slit or an aperture diffracts light. Even then we say light travels in a straight line and ray optics is valid. Comment (2)

**Q30. (a)** In a transistor, base is made thin and doped with little impurity atoms. Why?(2)

(b) Draw a circuit diagram of a full-wave rectifier. Explain its working principle. Draw the input/output wave forms indicating clearly the functions of the two diodes used.(3)