

- Q. 1.** What should be the length of a dipole antenna for a carrier wave of frequency 6×10^8 Hz? **1**
- Q. 2.** Show graphically how the stopping potential for a given photosensitive surface varies with the frequency of the incident radiation. **1**
- Q. 3.** In a series LCR circuit, the voltage across an inductor, capacitor and resistor are 20 V, 20 V and 40 V respectively. What is the phase difference between the applied voltage and the current in the circuit? **1**
- Q. 4.** Under what condition does an electron moving through a magnetic field experience maximum force? **1**
- Q. 5.** How does the coulomb force between two point charges depend upon the dielectric constant of the intervening medium? **1**
- Q. 10.** Establish a relation between current and drift velocity. **1**
- Q. 11.** A charge q is placed at the centre of the line joining two equal charges Q . Show that the system of three charges will be in equilibrium if $q = -Q/4$. **2**

Or

A $5 \mu\text{F}$ capacitor is charged by a 100 V supply. The supply is then disconnected and the charged capacitor is connected to another uncharged $3 \mu\text{F}$ capacitor. How much electrostatic energy of the first capacitor is lost in the process of attaining the steady situation?

- Q. 13.** The potential difference across the terminals of a battery of emf 12 V and internal resistance 2 ohm drops to 10 V when it is connected to a silver voltmeter. Calculate the silver deposited at the cathode in half an hour. Relative atomic mass of silver is 108. **3**
- Q. 15.** Define mutual inductance and give its S. I. unit. Derive an expression for the mutual inductance of two long coaxial solenoids of same length wound one over the other. **3**
- Q. 17.** A double convex lens made of glass of refractive index 1.6 has its both surfaces of equal radii of curvature of 30 cm each. An object of 5 cm height is placed at a distance of 12.5 cm from the lens. Find the position, nature and size of the image. **3**