

### Magnetic Effects and Electromagnetic Induction

- Q.1 Mention two characteristics of properties of material suitable for making core of transformer?  
[1]
- Q.2 Using the concept of force between two infinitely long parallel wires, define one ampere of current.  
[1]
- Q.3 Two spherical bobs, one metallic and the other of glass, of same size are allowed to fall from the same height above the ground. Which of the two will reach the ground earlier and why? [1]
- Q.4 Twelve wires of equal length are connected in the form of a skeleton cube which is moving with velocity  $v$  in the direction of the magnetic field  $B$ . find the emf in each arm of the cube. [2]
- Q.5 If the current sensitivity of a moving coil galvanometer is increased by 20% its resistance is increased by 1.5 times. How will the sensitivity of the galvanometer be affected? [2]
- Q.6 State the underlying principle of a cyclotron. Write briefly how this machine is used to accelerate particles to high energy [2]
- Q.7 A capacitor  $C$ , variable resistor  $R$  and a bulb  $B$  are connected in series to the ac mains. The bulb glows with some brightness. How will the glow be affected if [a] a dielectric is introduced between the plates of capacitor keeping resistance same [b] the resistance is increased keeping capacitance same. [2]
- Q.8 [a] For a given ac circuit  $I = i_0 \sin \omega t$ , show that average power dissipated in a resistor  $R$  over complete cycle is  $i_0^2 R/2$   
[b] A light bulb is rated at 100W for a 220V ac supply. Calculate the resistance of the bulb  
[3]
- Q.9 The current flowing through an inductor of self inductance  $L$  is continuously increasing. Plot a graph showing variation of [a] magnetic flux versus current [b] induced emf versus  $di/dt$  [c] magnetic potential energy stored versus the current. [3]
- Q.10 [a] Derive an expression for torque on rectangular current carrying loop suspended in a uniform magnetic field.  
[b] A proton and deuteron having equal momenta enter a region of uniform magnetic field at right angle to the direction of the field. Depict their trajectories in the field. [5]