

Practice Question paper for revision

Applied Physics

2 Hours

Total marks 60

N.B. (1) Question 1 is compulsory.

(2) Attempt any three Questions from question 2 to 6

(3) Used suitable data wherever required

(4) Figures to the right indicate full marks

Q 1 Attempt any five of the following

15

- Define the terms: Space lattice, unit cell, lattice parameter.
- Draw the following planes (123), (120), [110].
- Define mobility & conductivity of charge carriers. State their SI units.
- The resistivity of Cu is 1.72×10^{-8} ohm-m. Calculate electron mobility in Cu if the electron concentration is $10.41 \times 10^{28}/m^3$.
- Compare soft and hard magnetic materials. Why soft magnetic materials are used in core transformer?
- Define reverberation time. Write Sabine's formula & explain the terms used in it.
- Define dielectrics, electric dipole and polarizability.

Q 2 (a) Describe in short the formation of energy band in solids & how it helps to classify materials into conductor, insulator & semiconductor with proper diagram.

8

(b) Explain atomic arrangement in diamond structure & calculate n , r , CN, APF, packing efficiency, void space & density.

7

Q 3 (a) Derive Bragg's law for xray diffraction. How powder method of x ray diffraction differs from rotating crystal method. Monochromatic high energy x ray are incident on a crystal. If first order reflection is observed

at an angle 3.4 degree, at what angle would second order deflection be expected. 8

(b) A magnetic material has magnetizing force 198 A/m & magnetization of 2300 A/m. Find the corresponding flux density & relative permeability if $\mu_0 = 4\pi \times 10^{-7}$. 7

Q4 (a) Calculate the critical radius of an ionic crystal in Ligancy for cubic and tetrahedral configuration 5

(b) State the acoustical requirements of a good auditorium. Explain how these requirements can be achieved. 5

(c) In a Hall effect experimental set-up, a sample of Ge has a donor density of $10^{21}/m^3$. State the type of sc, & determine Hall coefficient & Hall voltage developed if 0.6 T magnetic field is used. Given: current density = 500 A/m² & sample thickness = 5mm. 5

Q 5 (a) Explain with neat diagram Construction and working of Solar cell.

(b) . Mention different types of polarizability in a dielectric? Explain electronic polarizability 5

(c) An ultrasonic beam of 1 cm wavelength sent by the ship returns from sea bed after 2 sec.If the velocity of ultrasonic beam in sea water is 1510 m/sec at 0 degree celcius, its salinity at 30 degree celcius is 29 gms/lit,calculate the depth of sea bed at 30 degree celcius and frequency of ultrasonic beam. 5

Q 6 (a) Explain the domain theory of ferromagnetism and with neat diagram explain Hysteresis effect in ferromagnetic material. 5

(b) What is magnetostriction effect? Draw the diagram of magnetostriction oscillator & explain its working as an ultrasound generator. 5

(c) Show that in intrinsic semiconductors, the Fermi level lies midway between conduction & valence band. 5

1.