



- (d) Differentiate between dielectrics and insulators. Name *two* sub-class of dielectric materials.
- (e) Define :
- (i) Drift velocity,
  - (ii) Mobility
  - (iii) Current density.
- Obtain their SI units.
- (f) What are piezoelectric and ferroelectric materials? Briefly explain their applications.
2. (a) Name different types of bondings in solids and briefly discuss the characteristics of each. 5
- (b) Explain how X-ray diffraction is useful for crystal analysis. Hence obtain Bragg's law. 5
3. (a) Derive the expression for the electrical conductivity of a metal. How is it affected by temperature and alloying? 5
- (b) Differentiate between intrinsic and extrinsic semiconductors. Why are semiconductors made extrinsic? 5
4. (a) Differentiate between paramagnetic, ferromagnetic, antiferromagnetic and ferrimagnetic

materials. Mention the differences between hard and soft magnetic materials. 5

- (b) What do you mean by polarization of materials? Name different types of polarization and briefly discuss them. 5

### PART B

*Question No. 5 is compulsory. Attempt any two questions from the remaining questions.*

5. Answer any five questions from the following:  $3 \times 5 = 15$

- (i) Explain the term tacticity in polymers.
  - (ii) Discuss vulcanisation of rubber.
  - (iii) Comment on good and poor throwing power. State the factors affecting throwing power.
  - (iv) Explain the ways by which metal ion concentration is maintained in electrolyte.
  - (v) Draw a well labelled diagram of dry cell. Write the electrode reactions taking place in it.
  - (vi) What is fuel cell? How is electrical energy produced from it?
6. (i) Write preparation, properties and uses of any two of the following:
- (a) Polystyrene

- (b) Nylon 6,6
- (c) Styrene-Butadiene rubber.  $3 \times 2 = 6$
- (ii) Explain free-radical addition polymerization mechanism. 4
7. (i) Write brief notes on any *two* of the following:
- (a) Purpose of Electroplating
- (b) Current density.
- (c) Chemical cleanliness. 4
- (ii) Describe the electroplating of:
- (a) Zinc
- (b) Copper. 6
8. (i) What are batteries? Give their classification with suitable examples. 4
- (ii) Write the advantages and uses of alkaline battery. 3
- (iii) Discuss the electrode reactions in mercury cell. 3