B. Tech.

(SEM. VI) EXAMINATION, 2006-07

METALLURGY & INDUSTRIAL CHEMISTRY

Time : 3 Hours] [Total Marks : 100

Note: Attempt all the six questions. Question - 1 carries 10 marks and other questions carry 18 marks each, which are indicated therein. Answer briefly and neatly. No negative marking.

1 Answer very briefly (one word or one line) 1+1×5=10 the following:

(a) Fill in the gaps.
   (i) The number of atoms present in the unit cell of HCP crystal structure is……
   (ii) Microstructure generally refers to the structure as observed under …… Microscope.

(b) Write full forms of:
   (i) BJT (related to semi conductors)
   (ii) NTPC (organization/industry)

(c) Write typical composition of
   (i) Brass
   (ii) Muntz metal

(d) Write materials for
   (i) Aircraft structure
   (ii) Drill bit.
(e) State whether the following statements are True or False.
(i) Graphite is an excellent solid lubricant
(ii) The stress strain behaviour of ceramic materials is not usually ascertained by a tensile test.

2 Answer any **two** of the following: **9×2=18**
(a) Discuss Bragg’s law of x-ray diffraction. What are its uses? Describe how the power method is used for the determination of crystal structure.
(b) Explain the various types of imperfections found in crystalline solids with the help of neat figures. Discuss briefly about twin boundaries and stacking faults.
(c) Explain the vacancy and interstitial diffusion mechanisms in crystalline solids. On what factors does diffusivity depend? Give some industrial applications of diffusion process.

3 Answer any **two** of the following: **9×2=18**
(a) Describe briefly, with neat sketches, the extractive metallurgy of aluminum or iron from ore to the metal.
(b) Describe the classification scheme of carbon steels and write their properties and specific applications.
(c) Describe briefly the methods of powder production in relation to powder metallurgy. What is sintering? Discuss its types/kinds and their applications.
4  Answer any two of the following: \(9 \times 2 = 18\)
(a) Discuss various types of ceramic structures by giving suitable examples. Give a classification scheme of ceramics on the basis of their applications. What is glass tempering? Explain.
(b) Explain the forward and reverse biasing in relation to p-n junctions, with the help of neat sketches. Also discuss volt-ampere characteristics of p-n junctions. What is a zener diode?
(c) What do you mean by a super conductor? Enlist various super conducting devices and their applications. What are Type I and II super conductors?

5  Write short notes on any three of the following: \(6 \times 3 = 18\)
(i) Glass fibre reinforced composites (GFRP)
(ii) Thermosets and thermoplasts
(iii) Processing of composite materials
(iv) Man made fibres
(v) Past, present and future uses of composite materials

6  Write brief notes on any four of the following:
(i) Fertilizers
(ii) Glass forming
(iii) Cement processing
(iv) Crystallography
(v) Soft and hard magnetic materials
(vi) Resins and oils
(vii) Types of corrosion.