Jharkhand University of Technology, Ranchi

Diploma 2nd Semester Examination, 2024 (NEP)

Subject : Materials for Engineering **Subject Code : MET201**

Time Allowed : 3 Hours **Full Marks : 70**

Answer in your own words. Answer any five *questions in which* Question No. 1 *is compulsory, and from rest of the questions answer* any four *only. All questions carry equal marks.*

1. Choose the correct answer: 2×7=14

(i) Atomic packing factor of a face centred cube is equal to
(a) 0·6 (b) 0·7
(c) 0·74 (d) 0·84

(ii) Corrosion resistance of stainless steel is due to
(a) chromium (b) vanadium
(c) carbon (d) sulphur

(iii) Brass is as an alloy of
(a) lead and tin (b) copper and zinc
(c) tin and silver (d) nickel and zinc

(iv) The purpose of annealing is to
(a) harden the steel (b) soften the steel
(c) oxidise the steel (d) carburise the steel

(v) _____ is a thermosetting plastic.
(a) PVC (b) Polythene
(c) Bakelite (d) Polystyrene

(vi) The eutectoid steels, contain _____ percent carbon.
(a) 0·2 (b) 0·6
(c) 0·8 (d) 1·0

(vii) During normalising process of steel, the specimen is heated _____.
(a) above the upper critical temperature and cooled in still air
(b) below the upper critical temperature and cooled in still air
(c) below the lower critical temperature and cooled in still air
(d) above the upper critical temperature and cooled in the furnace

2. (a) Calculate the Atomic Packing Factor (APF) of Face Centred Cubic (FCC) crystal structure.

   (b) List the different types of cast irons. Explain the properties, applications and microstructure of grey cast iron and ductile cast iron. 7+7

3. (a) Draw the Fe-Fe_3C diagram with all temperatures, phases and explain all invariant reaction in this diagram.

   (b) What are the procedure steps to be performed to see the microstructure under microstructure of any metals? 7+7

4. (a) What is composite and what are the different categories of composite materials. Describe the various engineering application of these composite materials.

   (b) What is the purpose of heat treatment? Explain briefly annealing, normalizing and hardening. 7+7

5. (a) What is Ceramic? Explain the different types of ceramics with examples and applications.

   (b) Write the chemical composition, properties and applications of copper and aluminium based alloys. 7+7

6. (a) Explain different types of corrosion. What are the different methods of preventing corrosions? Explain in brief.

   (b) Differcentiate between addition polymerization and condensation polymerization? 7+7

7. Write shorts notes on *any four* of the following: 3½×4=14

   (a) Thermoplast and Elastomer polymer
   (b) High carbon steels with properties, chemical composition, applications
   (c) High speed steel
   (d) Nano Materials
   (e) Nitriding
   (f) Galvanic series