

# 17303

16172

3 Hours / 100 Marks

Seat No.

--	--	--	--	--	--	--	--	--

- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.

**Marks**

1. Attempt any TEN of the following :

20

- (a) Define : (i) Unit Cell; (ii) Space Lattice.
- (b) Why different properties of materials should be studied ?
- (c) Define : (i) Phase, (ii) Solid solution.
- (d) What is heat treatment ? State its two advantages.
- (e) How steels are classified based on carbon content ?
- (f) State the various quenching medias used for heat treatment.
- (g) What is alloy steel ? Give two examples.
- (h) State different types of cast irons.
- (i) State two properties and any two applications of copper.
- (j) List any four properties of Aluminium.
- (k) What are the polymers ? Name any two polymeric materials.
- (l) Name any four non-metallic materials with their applications.
- (m) State any four applications of powder metallurgy.
- (n) What are the advantages of Non-destructive testing ?

**2. Attempt any FOUR of the following :****16**

- (a) What is packing efficiency of a unit cell ? Calculate the packing efficiency of BCC structure.
- (b) Define the following :
  - (i) Ductility
  - (ii) Plasticity
  - (iii) Density
  - (iv) Strength
- (c) Explain substitutional and interstitial solid solution with neat sketch.
- (d) With neat sketch explain Cu – Ni binary isomorphous system.
- (e) What are the objectives of heat treatment ?
- (f) Explain TTT diagram of plain carbon steel with neat sketch.

**3. Attempt any FOUR of the following :****16**

- (a) Give the detail classification of engineering materials.
- (b) Explain Lead and Tin binary eutectic system with neat sketch.
- (c) What are the various phases exists on Fe – Fe<sub>3</sub>C diagram ?
- (d) Define Annealing. State the effects of Annealing on properties of steel.
- (e) State the effect of following alloying elements on steel :
  - (i) Nickel
  - (ii) Molybdenum
  - (iii) Chromium
  - (iv) Tungsten
- (f) What is 18-4-1 tool steel ? State its applications.

**4. Attempt any FOUR of the following :****16**

- (a) Draw a neat sketch of Iron-Iron carbide equilibrium phase diagram.
- (b) What is Normalising ? State its purpose & also explain how normalising is carried out.
- (c) Define Hardening. Explain how hardening is carried out.
- (d) What is stainless steel ? State the important properties and applications of stainless steel.
- (e) What is Muntz metal ? State its properties and applications.
- (f) What is Brass ? State its properties and applications.

**5. Attempt any FOUR of the following :****16**

- (a) What is carburizing ? List the methods of carburizing. Also state any two applications of carburizing.
- (b) What is surface hardening ? State the needs of surface hardening.
- (c) Differentiate between white cast iron and gray cast iron.
- (d) Write down the composition of
  - (i) 40CrMo2
  - (ii) FeE400
  - (iii) 45C10S18
  - (iv) 40C8
- (e) What are the desired properties of bearing materials ?
- (f) Compare thermoplastics and thermosetting plastics.

**P.T.O.**

**6. Attempt any FOUR of the following :****16**

- (a) Compare Austempering and Martempering.
  - (b) Suggest the suitable steel for the applications of
    - (i) Crankshaft of I.C. Engine
    - (ii) Propeller shaft of a truck
    - (iii) Car bodies
    - (iv) Household utensils
  - (c) State the properties and applications of glass wool.
  - (d) What is Acrylic ? Give its properties and applications.
  - (e) Draw a block diagram showing various steps involved in powder metallurgy.
  - (f) What is non-destructive testing ? List the various methods of NDT.
-