22449

12425

03 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

a) Define the term coordination number.

b) Define the term 'Degree of freedom' used in equilibrium diagram.

c) State the minimum and maximum solubility limit of carbon in ferrite α-iron.

d) State the purpose of Normalising heat treatment process.

e) List out any four application of powder metallurgy process.

f) List two lattice parameter of unit cell.

g) Define the term Hardening and Hardenability.

Marks

2. Attempt any THREE of the following : **12**

a) Explain Hume Ruthery's rule for solid solution.

b) Calculate total number of atoms present in BCC and HCP unit cell.

c) Draw crystal structures of BCC and FCC also states their packing fraction.

d) List out various crystal defects also states their effects on mechanical properties.

3. Attempt any THREE of the following : **12**

a) Define the following terms –

i) Isomorphus system

ii) Eutectic system.

b) Draw the cooling curve of pure metal and alloy.

c) Describe the procedure to draw binary equilibrium diagram.

d) State the importance and application of Gibbs Phase Rule.

4. Attempt any THREE of the following : **12**

a) Differentiate between Case hardening and Surface hardening.

b) State the purpose and importance of heat treatment process.

c) List the various cooling methods used in heat treatment process also state their effects on grain size and mechanical properties of material

d) Draw TTT diagram for Eutectoid steel and state its significance.

e) Explain the various steps in powder metallurgy process.

Marks

5. Attempt any TWO of the following : **12**

a) List the types and state the properties the of cast irons. Sketch the microstructure of the same.

b) Write composition, properties and application of –

i) Muntz metal

ii) Gun metal

iii) Naval Brass

c) Draw iron-iron carbide equilibrium diagram also labelled following points, temperatures and phases.

i) Eutectic point

ii) Eutectoid point

iii) Peritectic point

iv) Lower critical temperature

v) Upper critical temperature

vi) Ferrite, delta and austenite phase

6. Attempt any TWO of the following : **12**

a) Write composition, properties and application of –

i) Heat resisting steel

ii) High speed steel

b) List out various methods of powder making and state their relative advantages, disadvantages and application.

c) Compare powder manufacturing process with casting process with respect to –

i) Need of further machining

ii) Wastage of material

iii) Ease of manufacturing

iv) Quality of product

v) Defects in products

vi) Application of process