22449

23124

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

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

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) 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 :–
   i) Unit Cell
   ii) Space Lattice

b) Enlist two uses of equilibrium diagram.

c) Define allotropy.

d) Enlist any four surface heat treatment process.

e) State the importance of powder metallurgy.

f) Draw crystal structure of BCC.

g) State the two purposes of normalizing.

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

a) Draw the crystal structure of FCC and HCP. State packing factor of FCC and HCP structure.

b) Explain the mechanism of dendritic growth.

c) Explain four factors of Humz-Rothery rules of solid solution.

d) Classify various imperfections of crystal and state the effect of any two imperfections on material properties.

P.T.O.

Marks

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

a) Explain the lever-rule as applied to equilibrium diagrams.

b) Describe the procedure to draw binary equilibrium diagrams.

c) Explain isomorphous systems with a neat sketch.

d) Differentiate between eutectic and peritectic systems. (Four points)

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

a) Draw a neat labeled diagram for eutectoid steel.

b) Differentiate between annealing and normalizing.

c) Explain nitriding process of heat treatment stating any two advantages and disadvantages.

d) Select the heat treatment process for –

i) Lathe bed hardening

ii) Gears of automobile

iii) Shaft of automobile engine

iv) Stress relieving of crank shaft.

e) Explain the procedure to manufacture self lubricated bearings.

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

a) Draw Iron-Iron carbide equilibrium diagram showing all phases, reactions and equations for it.

b) Classify the various types of steel and state an application of each.

c) State the composition, properties and applications of the following materials –

i) Naval Brass

ii) Duralumin

iii) Copper Bronze.

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

a) i) Explain the composition and application of HSS.

ii) Enlist any three properties and applications of Laminated and Fiber Reinforced materials.

b) Explain the steps involved in powder metallurgy process.

c) Classify various methods of powder making and state their relative merits and demerits and applications.

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