22449

11920

3 Hours / 70 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) 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 terms crystal structure and unit cell.

b) State two application of equilibrium diagram.

c) Define the term allotropy with suitable example.

d) Classify heat treatment processes.

e) State two applications of powder metallurgy.

f) Draw crystal structure of FCC.

g) State two applications of induction harderning process.

Marks

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

a) State types of solid solution and Flume Rothery's rule of solid solution.

b) Describe mechanism nuclei formation and crystal grain growth.

c) Define the following terms.

(i) Space lattice

(ii) Packing Factor

(iii) Solid Solution

(iv) Co-ordination number.

d) Describe imperfection of crystal structures with suitable sketches.

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

a) Explain Gibb's phase rule.

b) Describe procedure to draw binary equilibrium diagrams.

c) Draw isomorphous systems and explain.

d) Describe eutectic systems with sketch.

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

a) Draw Time - Temperature - Transformation diagram for eutectoid steel.

b) Distinguish between annealing and tempering.

c) Suggest suitable heat treatment with justification for the following.

(i) Gears used in aeroplane.

(ii) Hardening of camshaft.

d) Explain solid carburising process.

e) State importance of powder metallurgy process with applications in defense products.

Marks

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

a) Draw Iron-Iron carbide equilibrium diagram and state the characteristic reaction on it.

b) Classify steel and cast iron and give application of each.

c) State application, properties and composition of the following materials.

(i) Y-alloy

(ii) Gun metal

(iii) Babbitt

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

a) State types of composite materials with properties and applications.

b) Describe powder metallurgy process with major applications.

c) Classify various methods of powder making and state their relative advantages, disadvantages and applications.