

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Which is an amorphous material?
a) Mica b) Brass c) Glass d) Cast iron
2. Which of the following is the most prone to atmosphere corrosion?
a) Silver b) Iron c) Tin d) Copper
3. Soft silver can be converted to hard silver by alloying it with
a) Copper b) Zinc c) Aluminium d) Tin
4. Superconductors are those substances which offer
a) No resistance to current flow b) Conduct electricity at high temperature c) conduct electricity at low temperature d) Do not conduct electricity
5. Reason out the difference in coefficient of thermal expansion for metals and polymers by giving suitable examples.
6. Sketch edge and screw dislocation in a material.
7. Give any two applications of phase diagram.
8. Which characterization technique can be employed for determination of surface morphology of a given material? Give its principle.

PART B - (4 X16 = 64 marks)

09. (a) With a neat sketch, describe the principle, working and application of metal (16) deformation process which focuses on the production of sheets/strips from ingot.

(OR)

- (b) Establish the relationship between field strength and magnetization of a (16) ferromagnetic material and indicate the significance of remanence, coercivity and magnetic saturation point by plotting a curve for different strength of applied magnetic field.

10. (a) Describe the mechanism of failure in materials which occurs at higher temperature. (16) Also indicate the different stages in the curve and list any four materials that are resistant to such failure.

(OR)

- (b) (i) Indicate the criteria of permanent deformation which is observed in closed packed planes and derive the same. **(8)**
- (ii) List the criteria for formation of interstitial and substitutional solid solutions. **(8)**
11. (a) (i) Illustrate the construction of the phase diagram of an alloy system which has same structure in all the composition. **(8)**
- (ii) Sketch and explain the cooling curve of any eutectic system. **(8)**
- (OR)**
- (b) Describe the procedure followed for the construction of TTT diagrams with neat sketch. Plot the different cooling curves and the final products formed from cooling austenite. **(16)**
12. (a) Sketch and describe a microscopic tool used in material science which reveals the finest details of internal structure of a material as small as individual atoms. **(16)**
- (OR)**
- (b) (i) Justify the statement “Surface properties of the material can affect the efficiency and behavior of the material when in service”. **(4)**
- (ii) Compare any two deposition techniques available for surface modification and coating of a material. **(12)**