

B.Tech I Year II Semester (R15) Supplementary Examinations December 2018

MATERIAL SCIENCE & ENGINEERING

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- What are types of bonds in solids?
 - Why alloying is required in metals?
 - What do you know by Isomorphous alloy systems?
 - Sketch binary phase diagram of Fe-Fe₃C and indicate all important points.
 - What are the properties and applications of grey cast Iron?
 - Write classification of steel. Give one example of each.
 - Write short notes on tempering process.
 - What is age hardening of metals?
 - Differentiate between particle and fiber reinforced materials.
 - What are the applications and properties of cermets?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 (a) Take an edge dislocation and describe Burger's circuit and Burger's vector.
(b) What do you understand by solid solution? What is the type of solid solution of Ni and Cu?

OR

- 3 (a) What type of solid solution exists between iron and carbon? Explain.
(b) Discuss the grain boundaries and its effect on the properties of metals.

UNIT – II

- 4 (a) Discuss the binary phase diagram of Al-Cu system and apply lever rule.
(b) Explain the following: (i) Coring miscibility gaps. (ii) Lever rule.

OR

- 5 (a) With help of an example in Cu-Ni phase diagram, explain the lever rule.
(b) Draw the microstructure of 0.8% C steel at eutectoid temperature of 727°C.

UNIT – III

- 6 (a) Discuss the structure and properties of white cast iron.
(b) Explain the structure and properties of Al and its alloys.

OR

- 7 (a) What is spheroidal graphite cast iron? Write its applications.
(b) Explain the properties and applications of Ti and its alloys.

UNIT – IV

- 8 (a) Explain the heat treatment of plastics.
(b) Explain any one of the TTT diagram and indicate all points.

OR

- 9 (a) Explain the principle of cryogenic treatment of alloys.
(b) Discuss the following: (i) Annealing. (ii) Normalizing with an example.

UNIT – V

- 10 (a) What are types of composites? Classify and write advantages of composites over metals.
(b) What are metal matrix composites? Where are they used?

OR

- 11 (a) What are laminar composites and sandwich panels? What are their applications?
(b) Sketch and explain the crystalline structure of glasses.