

B.Tech I Year II Semester (R15) Supplementary Examinations December 2016

**MATERIAL SCIENCE & ENGINEERING**

(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

**PART - A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Enumerate the various types of bonds in crystals.
  - Calculate the volume of FCC unit cell in terms of the atomic radius R.
  - What is meant by monotropy?
  - Write any two uses of eutectic alloys.
  - What are the desirable properties and applications of Gray C.I, Nodular C.I?
  - How the non-ferrous metals and its alloys are classified?
  - What is meant by TTT, what are the different names for the TTT-diagram?
  - What is the maximum solubility of carbon in alpha-iron and delta-iron?
  - List the various functions that a matrix phase performs in a composite material.
  - What are the disadvantages of carbon fibres?

**PART - B**

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

**UNIT - I**

- 2 How the planar defects are classified in crystals? Explain briefly with neat sketches.

**OR**

- 3 What is meant by APF? With neat diagram attain the value of APF for different structures.

**UNIT - II**

- 4 What is meant by coring? Explain the concept with neat diagram.

**OR**

- 5 With neat diagrams explain the cooling curves for pure metal and binary solid solution alloys.

**UNIT - III**

- 6 Classify types of cast iron. Discuss any one. Draw its microstructure also.

**OR**

- 7 Classify types of steels. Discuss any one. Draw its microstructure also.

**UNIT - IV**

- 8 With neat sketch explain the effect of alloying elements on iron-Carbide diagram.

**OR**

- 9 (a) What are the stages of annealing? Explain the stage-I annealing process in detail.  
 (b) Name the factors that affect recrystallization temperature and explain the dependence on those process parameters.

**UNIT - V**

- 10 (a) What are boron fibers? Write the process for fabrication of boron fibers. Write its applications.  
 (b) What are aramid fibers? Write the process for fabrication of aramid fibers. Write its applications.

- 11 Describe two manufacturing methods of ceramic matrix composite.

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