

B.Tech II Year I Semester (R13) Regular &amp; Supplementary Examinations December 2015

**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)
- Define Crystallographic planes.
  - List the types of solid solutions.
  - What is an equilibrium diagram?
  - Mention the reasons for alloying cast Iron.
  - What is S.G. Iron? Give the structure of S.G. Iron.
  - Give the classification of Al-alloys.
  - List the stages associated with Malleabilising heat treatment cycle.
  - What is Cyaniding process?
  - Mention any two properties of glass.
  - What are Cermets?

**PART – B**

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

**UNIT – I**

- 2 Define a unit cell. Determine the APF for FCC structure.

**OR**

- 3 (a) Explain Gibb's phase rule.  
(b) What is a solid solution? List Hume Rothery's rules for the formation of solid solution.

**UNIT – II**

- 4 Describe clearly the construction of phase diagrams using cooling curves.

**OR**

- 5 Describe the following transformations:  
(a) Eutectoid transformation.  
(b) Peritectoid transformation.

**UNIT – III**

- 6 Mention the characteristics of the following:

- Grey cast iron.
- Malleable cast iron.

**OR**

- 7 Write briefly on the characteristics and properties of the following alloys:  
(a) Titanium alloys.  
(b) Al-alloys.

**UNIT – IV**

- 8 What is TTT diagram? Explain the steps employed to construct TTT diagrams.

**OR**

- 9 With sketches describe the following heat treatment processes:  
(a) Austempering process.  
(b) Martempering process.

**UNIT – V**

- 10 Define ceramics. Give the classification and list down the examples of ceramic materials.

**OR**

- 11 (a) Define composite material. List the functions of the following:  
(i) Matrix material. (ii) Reinforcement materials.  
(b) Sketch and describe the liquid metallurgy route (casting) of producing MMC's.

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