Code: 13A03301 **R13**

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

MATERIAL SCIENCE & ENGINEERING

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Define Crystallographic planes.
(b) List the types of solid solutions.
(c) What is an equilibrium diagram?
(d) Mention the reasons for alloying cast Iron.
(e) What is S.G. Iron? Give the structure of S.G. Iron.
(f) Give the classification of Al-alloys.
(g) List the stages associated with Malleabilising heat treatment cycle.
(h) What is Cyaniding process?
(i) Mention any two properties of glass.
(j) 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:

(a) Grey cast iron.
(b) 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.

*****