**Code: 13A03301** **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations November/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)

(a) Define Co-Ordination number.
(b) Define Solid solution.
(c) List the significance of studying Equilibrium diagrams.
(d) Mention the classification of Equilibrium diagrams.
(e) What is S.G. Iron? Give the structure of S.G. Iron.
(f) List the classification of copper alloys. Also indicate the principal elements present.
(g) Define Critical cooling rate.
(h) What are Quench cracks? List the reasons for their occurrences.
(i) Define Ceramics. Give the classification of ceramics.
(j) List the functions of matrix materials and reinforcements used in MMCs.

**PART – B**

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

**UNIT – I**

2 With neat sketches describe the different types of bonds in solids.

**OR**

3 (a) Describe Hume-Rothery rules governing the formation of substitutional solid solution.
(b) Sketch and describe the following: (i) Substitutional solid solution. (ii) Interstitial solid solution.

**UNIT – II**

4 (a) Describe Gibbs Phase rule.
(b) In a Lead Tin (Pb-Sn) system the following invariant reaction was observed at a temperature of 183℃.
$\alpha\ (19\%Sn) + \beta\ (97\%Sn) \rightarrow$ Liquid $(62\%\ Sn)$.
Melting points of Lead and Tin are $327^0$c and 232℃.
(i) Draw the phase diagram.
(ii) Calculate the fraction of total α in the alloy containing $80\%\ Sn$ at 182℃.

**OR**

5 With a neat sketch explain clearly the experimental method of constructing equilibrium diagrams.

**UNIT – III**

6 Write down the classification, composition, properties and uses of any two types of Cast Iron.

**OR**

7 Write brief notes on the following:
(a) Copper alloys.
(b) Aluminium alloys.

**UNIT – IV**

8 Sketch and describe Iron carbon equilibrium diagram. Show all the salient points on the diagram.

**OR**

9 Define Hardenability. Describe Jominy hardenability test.

**UNIT – V**

10 (a) Define Composite. How are composites classified?
(b) Write a brief note on Glass.

**OR**

11 Sketch and describe the following:
(a) Liquid Metallurgy route of producing MMCs.
(b) Vacuum bag moulding process..

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