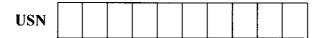
(06 Marks)

(06 Marks)

3



Fourth Semester B.E. Degree Examination, December 2012 **Material Science and Metallurgy**

Time: 3 hrs. Max. Marks:100

> Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART - A

1	b.	What is diffusion? Explain. Give the Fick's laws of diffusion and their conditions. (08 Iron has an atomic radius of 0.124 nm, B.C.C. crystal structure and an atomic we	
2	a.	Define the following terms: i) Proportional limit ii) Hardness iii) Resillience iv) Toughness (08)	8 Marks)

yield point. (06 Marks)

a. Draw S-N diagram for steel and aluminium alloy and explain the salient features. (06 Marks)

Explain how yield strength is determined for a material which does not exhibit a distinct

b. Explain Brinell hardness and Rockwell hardness with sketch and equations.

- Sketch creep curve and explain different stages of creep. b. (06 Marks) Explain fatigue failures and give the methods of reducing fatigue failure. (08 Marks)
- Explain the mechanism of solidification and homogeneous and heterogeneous nucleation. (06 Marks)
 - State and explain Hume-Rothery's rules for solid solution. (05 Marks)
 - c. Differentiate between interstitial and substitutional solid solutions. (04 Marks) (05 Marks)
 - State and explain with example the Gibb's phase rule.

b. Discuss the composition and uses of α -brasses and bronzes.

PART - B

- Draw neatly Iron-carbon diagram and label all the parts. 5 (08 Marks) a. With the help of above diagram, explain cooling of steel with 0.9% carbon showing the (06 Marks)
 - micro-structure at different stages. Draw TTT diagram for eutectoid steel and explain the microstructures obtained at various (06 Marks) cooling rates.
- What is heat treatment? Classify the various types of heat treatments. 6 (08 Marks) a. What is meant by carburizing of steels? Explain various types of carburizing. (08 Marks) b.
 - Differentiate between annealing and normalizing. (04 Marks)
- a. Explain different types of cast irons with microstructure. (08 Marks) 7
 - c. Write short note on Aluminium alloys. (06 Marks)
- 8 Differentiate between a composite and alloy. (02 Marks) a. Classify the composites based on reinforcement and matrix materials. b. (06 Marks)
 - Explain with sketches any two methods of production of FRP's. (06 Marks) Explain with sketches any two methods of production of MMC's. (06 Marks)