

Code No: 53018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November - 2015

METALLURGY AND MATERIAL SCIENCE

(Common to ME, MCT, AME)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1. List out the types of bonds in solids. Explain any two of them. [15]
- 2.a) What are the conditions that are favorable for extensive solid solubility of one element in another? Explain them.
b) Draw the cooling curves for short and long freezing range alloys and describe the salient points in them. [7+8]
- 3.a) What is lever rule? Explain how it is useful?
b) A with melting point 1250°C and B with melting point 1050°C form a compound AB_2 which contains 45%A and melts at 1150°C . This compound form an eutectic with B at 850°C and contains 15%A. The solubility of compound in B is 3% at the eutectic temperature and decreases to zero at room temperature. B is not a soluble in compound. Second eutectic is formed between B and A at 750°C containing 75%A and there is no solid solubility. Draw the equilibrium diagram to the scale. Label all points and areas. [7+8]
- 4.a) What is the effect of sulphur, manganese, silicon and phosphorous on the properties of plain carbon steels.
b) Why a malleable cast iron is made only from hypoeutectic white cast iron? Explain the heat treatment cycle. [7+8]
- 5.a) Describe the effect of alloying elements on TTT diagrams.
b) Compare and contrast between Induction hardening and Flame hardening. [7+8]
- 6.a) Describe the effect of increasing zinc content on the properties of brasses.
b) List out the characteristics and properties of Aluminum and Titanium alloys. [7+8]
- 7.a) With the aid of a flow sheet classify the composite materials.
b) Describe how the metal matrix composite materials are produced by liquid metallurgy route. [7+8]
8. Write explanatory notes on:
 - a) Crystalline ceramics
 - b) Abrasive materials. [7+8]