

Code No: 133BG

**R16****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year I Semester Examinations, April/May - 2018****METALLURGY AND MATERIALS SCIENCE****(Common to ME, MCT, MSNT)****Time: 3 Hours****Max. Marks: 75**

**Note:** This question paper contains two parts A and B.  
Part A is compulsory which carries 25 marks. Answer all questions in Part A.  
Part B consists of 5 Units. Answer any one full question from each unit.  
Each question carries 10 marks and may have a, b, c as sub questions.

**PART- A****(25 Marks)**

- 1.a) Differentiate between crystallize ceramics and cermet's [2]
- b) What is congruent melting intermediate phase? [3]
- c) Define composite. [2]
- d) Define allotropy and give examples. [3]
- e) Differentiate between annealing and normalizing. [2]
- f) Explain why grain boundaries look darker under the microscope, while the grains look brighter. [3]
- g) Which alloy of Fe-Fe<sub>3</sub>C system has the lowest melting point? [2]
- h) Differentiate between spheroidal graphite cast Iron & gray cast Iron. [3]
- i) Differentiate between hardness and hardenability. [2]
- j) What are  $\alpha$ -Stabilizers in titanium alloys? [3]

**PART- B****(50 Marks)**

- 2.a) What is the effect of grain boundaries on the properties of metal & Alloys? [5+5]
  - b) Distinguish between Metallic bond and chemical bond. [5+5]
- OR**
- 3.a) State Hume-Rothery's rules for the formation of substitutional solid solution. [5+5]
  - b) Differentiate between metal and alloy. [5+5]
- 4.a) What is phase rule, Lever rule and cooling curve. [5+5]
  - b) What is Isomorphous alloy system explain with suitable example. [5+5]
- OR**
- 5.a) Draw and explain TTT Diagrams. [5+5]
  - b) Explain about chemical case hardening techniques. [5+5]
6. Write explanatory notes on Annealing, Normalizing, Hardening and Tempering. [10]
- OR**
7. Differentiate between construction of TTT curves and Phase diagrams. [10]

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8. Write explanatory notes on:  
a) Copper and its Alloys  
b) Aluminium and its Alloys. [5+5]

OR

9. Enumerate the characteristics, properties and applications of Titanium alloys. [10]

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10. Write Short notes on:  
a) Metal ceramic mixtures  
b) C-Composites. [5+5]

OR

11. Write short notes on:  
a) Polymers  
b) Ceramics. [5+5]

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