

**Code No: 113AQ****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B.Tech II Year I Semester Examinations, November/December - 2017****METALLURGY AND MATERIALS SCIENCE****(Common to ME, MCT, AME)****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) Find the packing efficiency in HCP lattice. [2]
- b) Lattice parameter of a FCC crystal is  $3.61\text{\AA}$  calculate atomic density in (111), (110) and (100) planes. [3]
- c) What is the necessity of Alloying? [2]
- d) Distinguish between Intermetallic Compound and Electron compound. [3]
- e) What is congruent melting phase? [2]
- f) Define allotropy and give examples. [3]
- g) What is ASTM-grain size number? What is its importance? [2]
- h) Distinguish between ordered and disordered solid solution. [3]
- i) What is coring and how it can be minimized? [2]
- j) What are the general requirements of a reinforcing phase? [3]

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

- 2.a) What is an interstitial solid solution, name the five elements which commonly form interstitial solid solutions?
- b) What is a grain size? What is a fine grained and coarse-grained material? [5+5]

**OR**

- 3.a) What is crystal system and explain the Bravais lattices?
  - b) Write explanatory notes ASTM grain size measuring methods. [5+5]
4. Write a note on Transformations of solid state. [10]

**OR**

5. Draw and explain the phase diagram where two components are completely soluble in both liquid and solid state with suitable examples. [10]

- 6.a) What is the effect of alloying elements on Fe-Fe<sub>3</sub>C diagram?
- b) Draw the TTT diagrams and explain the different cooling rates. [5+5]

**OR**

- 7.a) What is hardenability and how it is measured?
- b) Differentiate between Hardening and Tempering. [5+5]

- 8.a) What is cast Iron and explain the classification of cast irons?
- b) Differentiate between Cu alloys and Al alloys with respect to properties, heat treatment, composition and microstructure. [5+5]

**OR**

- 9.a) Draw and Explain the Cu-Zn phase diagram.
- b) Write short notes on Ti alloys. [5+5]

10. Enumerate the characteristics, properties and applications of Polymers. [10]

**OR**

11. Write Short notes on:

a) Metal ceramic mixtures.

b) C- Composites.

[5+5]