Code No: 133BG **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2017
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) Find the packing efficiency in HCP lattice. [2]
b) Lattice parameter of a FCC crystal is 3.61A^0 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 Brevais 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_3C 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]

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