Code No: 113AQ

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, February/March-2016

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) Distinguish between Unit cell and space lattice. [2]
b) What is ASTM-grain size number? [3]
c) Explain Lever rule with an example. [2]
d) What do you mean by Isomorphous system? [3]
e) What are the effects of non-equilibrium cooling of alloys? [2]
f) Distinguish between hardness and hardenability. [3]
g) Why is it easier to control the properties of cast irons as compared to steels? [2]
h) Why age hardening process is two step process? [3]
i) What is Isomerism? Explain with example. [2]
j) What is degree of polymerization? Explain its significance. [3]

PART-B (50 Marks)

2.a) Distinguish between single crystal and poly crystal. Explain their effect on properties of materials.
b) List out different types of Bravais lattice structures with their characteristics and examples. [5+5]

OR

3. What is co-ordination number? Find the co-ordination number for simple cubic, face central cubic and hcp systems. [10]

4.a) Explain the governing rules for the formation of substitutional solid solutions.
b) Distinguish between electron compounds and intermetallic compounds with examples. [5+5]

OR

5.a) Explain the relationship between equilibrium diagrams and properties of alloys.
b) Discuss about congruent melting phases. [5+5]

6. Draw Fe-Fe_3C phase diagram and explain the phase transformation reactions in the diagram. [10]

OR

7.a) Explain the effects of ferrite stabilizers and austenite stabilizers on Fe-Fe_3C phase diagram.
b) What is quench severity? Explain its role on hardenings of steels. [5+5]

8.a) Distinguish between α, β and α+β titanium alloys with respect to composition, microstructure, properties and applications.

b) Explain the role of solvus curve in phase diagrams for age hardenable alloys. [5+5]

OR

9.a) Draw the partial Al-Cu phase diagram (up to 10% Cu) and explain engineering significance of Al with 4-5% Cu.

b) Explain how the property of aluminium alloys changes on age-hardening. [5+5]

10.a) Explain the differences between crystallization of polymers and other solids.

b) What factors affect the crystallization of polymers? [5+5]

OR

11.a) Differentiate between thermoplastic polymers and thermosetting polymers. Give minimum two examples of each type.

b) What is vulcanization of rubber? Why it is done? [5+5]

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