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Code No: 123AQ

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, November/December - 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) What is electron compound? Give examples. [2]
b) What is meant by miscibility gaps? [3]
c) What is lever rule? [2]
d) Differentiate between allotropy and polymorphism. [3]
e) Define hardenability. [2]
f) Differentiate between tool steel and Die steel. [3]
g) Define ceramic and composite. [2]
h) Differentiate between annealing and normalizing. [3]
i) Explain why grain boundaries look darker under the microscope, while the grains look brighter. [2]
j) Which alloy of Fe-Fe_3C system has the lowest melting point? Give its properties. [3]

PART-B

(50 Marks)

2.a) Explain about Hume Rother's rules.
b) Explain about the types of solid solution with neat sketch. [5+5]

OR

3.a) Explain the various allotropic forms of Iron and their properties.
b) Explain with neat diagrams how the micro structure of a pure metal may change with additions of alloying elements. [5+5]

4.a) Calculate the relative amounts of various phases that are present in 0.5 % C Steel, Just above and Just below the peritectic temperature.
b) Draw the copper rich portion of the Cu-Zn phase diagram and label the various points. [5+5]

OR

5.a) With a neat sketch explain about Fe-Fe_3C Diagram.
b) What are the micro constituents of Fe-Fe_3C diagram and define each one. [5+5]

6. What are coring? Explain types of coring and the mechanism associated with it, discuss the remedial acts to remove coring. [10]

OR

7. Explain about the following heat treatment operations:
a) Solution-heat treatment
b) Age hardening. [5+5]

8.a) Gray cast Iron is brittle, in spite of having soft phase (i.e.) Ferrite and graphite in its micro structure, Explain with suitable reason.

b) Differentiate between white cast iron and malleable cast iron. [5+5]

OR

9. Describe the composition, heat treatment methods and applications of the aluminium and its alloys. [10]

10. Give the definition, properties and applications of the following:
    a) C-C composites
    b) Fiber reinforced materials. [5+5]

OR

11. Write short notes on:
    a) Metal matrix composites
    b) Abrasive materials. [5+5]

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