Code: 13A03301 **R13**

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017

MATERIAL SCIENCE & ENGINEERING

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What is unit cell? List any two metallic structures with examples.

(b) If the atomic radius of A1 is 0.143 nm then, calculate the volume of its unit cell.

(c) What are different reactions in binary phase diagram.

(d) How Grain boundaries influence the ductility of materials.

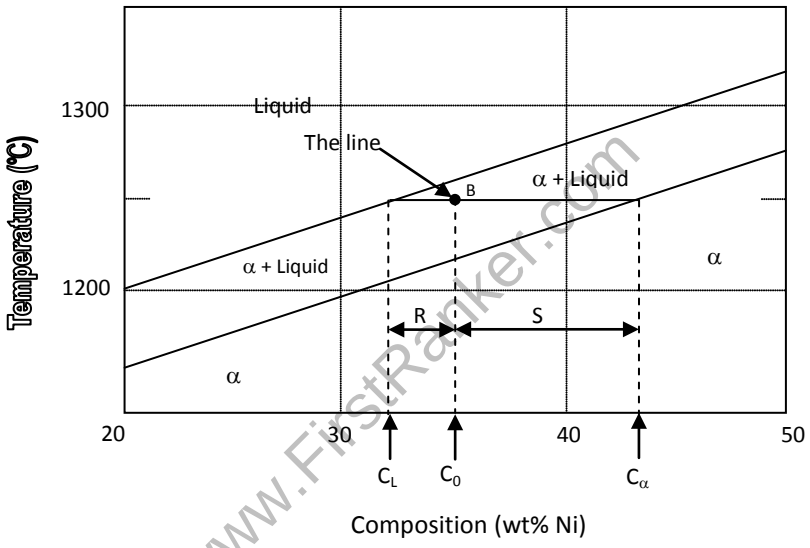
(e) What is the difference between brass & bronze?

(f) Briefly explain why grey cast iron is brittle.

(g) What is the difference between hardness & hardenability?

(h) Explain the normalizing treatment.

(i) Compute the fractions of each of α and liquid phases of given phase diagram. Given C_0 = 35 wt% Ni, C_a = 42.5 wt% Ni, C_L = 31.5 wt% Ni.



(j) What are the advantages of fiber reinforcement in composites?

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Define APF (Atomic Packing Factor) and derive unit cell length & calculate APF for FCC, BCC if the radius of atom is 'R'.

OR

3 Explain different crystalline defects with neat sketch.

UNIT – II

4 Explain any three heat treatment processes in detail.

OR

5 Explain the time-temperature-transformation (TTT) characteristics of eutectoid steel.

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UNIT – III

6 Write about different types of cast iron and explain their properties?

OR

7 How does carbon influences the properties of iron? What are the different types of steels?

UNIT – IV

8 Explain any two manufacturing methods of FRP (Fiber Reinforced Plastics).

OR

9 What are the benefits of composite materials over the metals and alloys? What are cermets?

UNIT – V

10 Draw "Fe-Fe_3C" diagram. Explain different reactions that occur in Iron Carbon diagram.

OR

11 What are different non-ferrous alloys? Explain the alloys of copper and aluminium.

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