

B.Tech II Year I Semester (R13) Supplementary Examinations June 2017  
**MATERIAL SCIENCE & ENGINEERING**  
 (Mechanical Engineering)

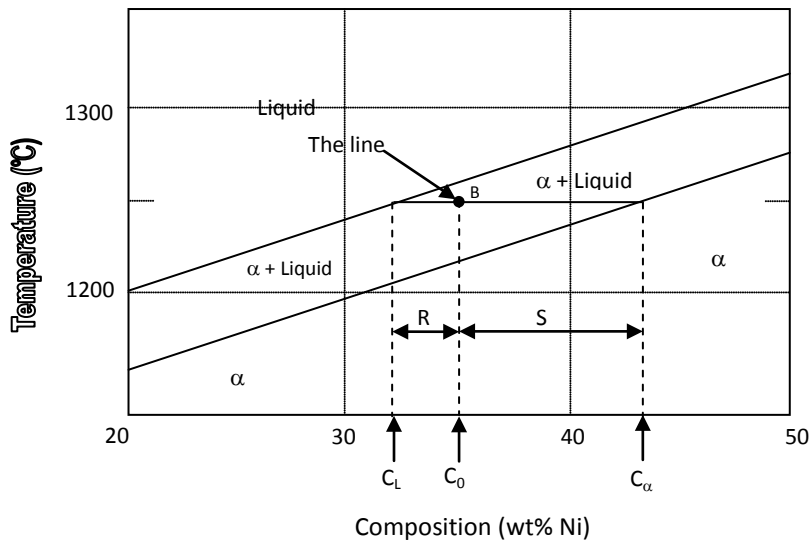
Time: 3 hours

Max. Marks: 70

**PART – A**  
 (Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- What is unit cell? List any two metallic structures with examples.
  - If the atomic radius of A1 is 0.143 nm then, calculate the volume of its unit cell.
  - What are different reactions in binary phase diagram.
  - How Grain boundaries influence the ductility of materials.
  - What is the difference between brass & bronze?
  - Briefly explain why grey cast iron is brittle.
  - What is the difference between hardness & hardenability?
  - Explain the normalizing treatment.
  - Compute the fractions of each of  $\alpha$  and liquid phases of given phase diagram. Given  $C_0 = 35$  wt% Ni,  $C_\alpha = 42.5$  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.

**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<sub>3</sub>C” 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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