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Total number of printed pages – 2

B. Tech  
PCMT 4201

**Third Semester Back Examination – 2014**  
**INTRODUCTION TO PHYSICAL METALLURGY**

**BRANCH (S) : MM, MME**

**QUESTION CODE : L 329**

**Full Marks – 70**

**Time : 3 Hours**

*Answer Question No. 1 which is compulsory and any **five** from the rest.  
The figures in the right-hand margin indicate marks.*



1. Answer the following questions : 2 × 10
  - (a) Define re-crystallization temperature.
  - (b) What is hardness ?
  - (c) What is cold working of metal ?
  - (d) What is the coordination number ?
  - (e) Define eutectoid reaction.
  - (f) What is burger's vector ?
  - (g) What causes decrease in hardness during tempering of plain carbon steel ?
  - (h) Draw the planes (1 2 3) and (1 0 2) in a cubic structure.
  - (i) What is resilience ?
  - (j) What is a ductile cast iron ?
2.
  - (a) What is a solid solution and discuss the difference between substitutional and interstitial solid solution ? 5
  - (b) Explain phase transformation. 5
3.
  - (a) Draw the iron-carbon phase diagram showing all phases and temperatures. 5
  - (b) Explain critical resolve shear stress. 5

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4. Discuss different types of cast irons with their properties and applications. 10
5. (a) Define the term heat treatment. Why the steels are heat treated ? 5  
(b) Differentiate between annealing and normalizing. 5
6. (a) What are the Hume-Rothery rules for solid solubility ? 5  
(b) Explain how a cored structure is produced in a 70%Cu-30%Ni alloy. 5
7. (a) Aluminium has FCC structure; its density is  $2700 \text{ kg/m}^3$ . Calculate the unit cell dimension and atomic diameter. Atomic weight of aluminium is 26.98. 5  
(b) Sketch a screw and edge dislocation and explain how they govern the plastic deformation in crystals. 5
8. Write short notes on any **two** of the following : 5 × 2  
(a) TTT diagram  
(b) Coring  
(c) Jominy end quench test  
(d) Strain Hardening.

