

Registration No. :

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Total number of printed pages – 2

B. Tech
PCMT 4201

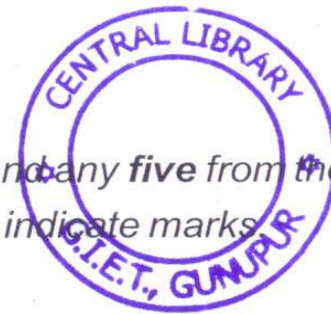
Third Semester Regular Examination – 2014
INTRODUCTION TO PHYSICAL METALLURGY

BRANCH : MM, MME

QUESTION CODE : H 401

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 Unit cell.
 - (b) What is coordination number in crystal structure ?
 - (c) What is hot working of metal ?
 - (d) What is the significance of a phase diagram ?
 - (e) Define eutectic reaction.
 - (f) What is burger's vector ?
 - (g) Why tempering is done ?
 - (h) Draw the planes (020) and (120) in a cubic structure.
 - (i) What is the maximum solubility of carbon in austenite phase ?
 - (j) What is meant by yield point phenomena ?
2.
 - (a) What are engineering materials and classify them ? 5
 - (b) Derive the expression for critical resolved shear stress of a single crystal. 5
3.
 - (a) Schematically draw TTT diagram of eutectoid steel and label it. 5

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- (b) Consider 2.5 kg of austenite containing 0.65 wt% C, cooled to
Below the eutectoid temperature. 5
- (i) What is the proeutectoid phase ?
- (ii) How many kilograms each of total ferrite and cementite form ?
- (iii) How many kilograms each of pearlite and the proeutectoid phase form ?
- (iv) Schematically sketch and label the resulting microstructure ?
4. Briefly explain about the defect in the crystal. 10
5. (a) Explain from Hume Rothery's rule for complete solid solutions in which
elements mix in each other. 5
- (b) Differentiate between annealing and normalizing. 5
6. (a) Define slip system. Do all metals have the same slip system ? Give reasons. 5
- (b) Define the term heat treatment. Why the steels are heat treated ? 5
7. (a) Aluminium has FCC structure, its density is 2700kg/m^3 . Calculate the unit
cell dimension and atomic diameter. Atomic weight of aluminium is 26.98. 5
- (b) Explain how a cored structure is produced in a 70%Cu-30% Ni alloy. 5
8. Write short notes on any two of the following : 5 × 2
- (a) Toughness
- (b) Gibbs phase rule
- (c) Hardness and hardenability
- (d) Strain Hardening.

