

Roll No.

24049

B. Tech. (3rd Sem.) Mechanical Engg.

(Branch – VII)

Examination – December, 2011

MATERIAL SCIENCE

Paper : ME-207-F

Time : Three hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions taking at least *one* question from each Section. *Question No. 1 is compulsory.*
Each question carries equal marks.

1. (a) Name different crystal systems. 2
- (b) Discuss Gibb's phase rule. 2
- (c) Write the characteristics of austenite and Pearlite. 2
- (d) Name the constituents of Iron and Steel. 2

- (e) Difference between elastic and plastic deformation. 2
- (f) Define Atomic Packing Factor. 2
- (g) Draw the (001) plane in a simple cubic cell. 2
- (h) Write advantages of polymers over metallic materials. 2
- (i) Discuss the factors influencing corrosion. 2
- (j) Define Recovery and Recrystallization. 2

SECTION – A

2. (a) Prove that the $\frac{c}{a}$ ratio of an ideal HCP unit cell is 1.632. 10
- (b) Calculate the Atomic packing factor values for simple cubic, BCC, FCC and HCP. 10
3. (a) What do you mean by Burger vector ? How is it determined in line and screw dislocation. 10
- (b) Differentiate between edge and screw dislocations with the help of neat sketches. 10

SECTION – B

4. (a) Explain Hume Rothery's Rules. 10
(b) Explain TTT diagram with neat sketch. 10
5. (a) Explain Eutectoid and Peritectoid transformation with neat diagrams. 10
(b) Explain Induction Hardening with neat sketch. 10

SECTION – C

6. (a) Differentiate between slip and twinning with the help of neat sketches. 10
(b) Explain yield point phenomenon and strain Ageing. 10
7. (a) Define Fracture and its types with sketches. 10
(b) What is Fatigue ? What are the causes and indications of fatigue failure ? How it can be prevented ? 10

SECTION – D

8. (a) Explain the mechanisms of polymerization. 10
(b) Write the properties of ceramic materials. 10

9. (a) Explain types of corrosion in metals and methods to prevent it. 10

(b) Explain the concept of creep in detail. 10