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Reg. No. :

Name :



**Fourth Semester B.Tech. Degree Examination, May 2014
(2008 Scheme)**

Branch : Mechanical Engineering

08.403 : METALLURGY AND MATERIAL SCIENCE (MP)

Time : 3 Hours

Max. Marks : 100

Instructions : 1) Answer **all** questions in Part – A.

2) Answer **any one full** question from **each** Module of Part – B.

PART – A

1. Sketch a FCC lattice and determine its packing factor value.
2. Show that parallel planes have same Miller Indices.
3. Explain the term “atomic bondings”. Name the types with examples.
4. With the help of sketches explain space lattice and unit cell.
5. What are the applications of diffusion in metals ?
6. Briefly explain the factors governing substitutional solubility.
7. Define Hardenability. How is it measured ?
8. Write notes on nano materials.
9. Describe the use of composites in engineering field.
10. In general, discuss the effect of alloying elements in metals. **(10×4= 40 Marks)**

P.T.O.



PART – B

Module – I

11. Using neat sketches explain :
- Point defects
 - Dislocations. 20
12. a) Explain the process of solidification of metals to form polycrystalline structure. 10
- b) Which are the parameters, controlling the grain size on solidification ? 10

Module – II

- Explain Fick's Law of Diffusion and Gibb's phase rule. 8
 - Explain the relation between structure and properties of materials. 12
14. Explain recovery, recrystallisation and grain growth stages during annealing. 20

Module – III

- What are the main factors leading to crack formations in metals under the influence of mechanical stress ? 10
 - Discuss the importance of a consideration of fatigue in engineering design. Explain the mechanism of fatigue failure and methods of improving fatigue strength. 10
16. What are the different varieties of cast iron ? Explain their properties and typical application. 20