Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree Examination, July 2015
(2008 Scheme)
Branch : Mechanical Engineering
08.403 : METALLURGY AND MATERIAL SCIENCE (MP)

Time : 3 Hours　　　　　　　　　　　　　　　　　　　　　Max. Marks : 100

Instructions : 1) Answer **all** questions from Part **A**.
　　　　　　　　 2) Answer **any one** question from **each** Module of Part **B**.
　　　　　　　　 3) Use suitable sketches for explaining answers.

PART – A

1. Explain electrical and magnetic properties of engineering materials.

2. Explain unit cell and space lattice.

3. Differentiate between Schottky and Frenkel defects.

4. Explain Frank-Read source of dislocation multiplication.

5. What are Hume Rothery's rules ?

6. Using TTT diagram and cooling paths explain the formation of Bainite and Martensite.

7. Explain induction hardening process.

8. Write a note on non destructive testing methods.

9. What is stainless steel ? Explain its properties.

10. Briefly explain the following :

a) Composite materials

b) Smart materials.

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PART – B

Module – I

11. a) Explain BCC, FCC and HCP structures. Obtain atomic packing factor and coordination number of each structure. 12

    b) Explain allotropic forms of pure iron. 8

12. a) Explain different types of bonding between atoms with examples and properties imparted to the crystals. 14

    b) Describe the deformation by slip in metals. 6

Module – II

13. a) Draw and explain Iron-Carbon equilibrium diagram. 12

    b) What is diffusion ? Explain Fick's first law of diffusion. 8

14. a) What are the objectives of heat treatment process ? Briefly explain Annealing process. 12

    b) Explain Recrystalisation and Grain growth. 8

Module – III

15. a) Differentiate between brittle fracture and ductile fracture. Explain Griffith's crack theory. 12

    b) Describe fatigue and creep. 8

16. a) Explain different types of cast iron. 10

    b) Write a note on :
       i) Aluminium alloys
       ii) Titanium alloys. 10

(3×20=60 Marks)