Code No. : 3282

FACULTY OF ENGINEERING

B.E. 2/4 (M/P) I Semester (Main) Examination, December 2010

METALLURGY AND MATERIAL SCIENCE

Time : 3 Hours] [Max. Marks : 75

*Note : Answer **all** questions from Part – **A**. Answer **any five** questions from Part – **B**.*

PART – A **(25 Marks)**

1. Distinguish between Edge and Screw dislocation.
2. Explain the three stages of creep with help of a neat creep curve.
3. What is a slip system ? Give the various slip systems in F.C.C materials.
4. What is Recrystallisation temperature ?
5. Define 'Fatigue'. Explain factors affecting fatigue.
6. State and explain ficks second law of diffusion.
7. Distinguish between solid solution and compound.
8. What are free cutting steels ? Give the composition.
9. What is subzero treatment in high speed steels ?
10. What is the composition of the following :
    a) High Speed Steel
    b) Dual Phase Steel.

PART – B (50 Marks)

11. A) Distinguish between Cold working and Hot working. What are the advantages of coldworking compared to hot working ? 10

B) Discuss in detail the variation in properties and structure of material when a cold worked material is heated to successively higher temperature.

12. A) Define the term 'Fracture'. Discuss various types of fracture. 4

B) Discuss slip and twinning as mechanisms of permanent deformation. 6

13. A) Discuss the construction of a Eutectic phase diagram. 6

B) Briefly discuss the applications of diffusion in mechanical engineering. 4

14. A) Draw a neat Fe-Fe_3c equilibrium diagram and label all points, lines and areas of significance. 5

B) Discuss the invariant reactions in Fe-C system. 5

15. Discuss the following giving composition, microstructure, Heat treatment, properties and applications. (2×5=10)

a) Grey cast Iron b) Mild steels c) $\alpha + \beta$ brass

d) Duralumins d) Managing steels.

16. With the help of isothermal transformation curves discuss the following : 10

a) Isothermal annealing b) Normalising

c) Austempering d) Martempering

17. Write short notes on **any four** of the following : 10

a) Effect of alloying elements on T.T.T. curve
b) Phase Rule
c) Bessemer converter
d) Cupola furnace
e) S.G. cast Irons
f) Austenitic stainless steel.