

Engineering Materials and Metallurgy
(ME-202/205, Dec 2006)

Time: 3 Hrs

Max Marks: 60

Note: Section A is compulsory. Attempt any five questions from Section B and any two questions from Section C.

Section-A

1. (a) Define atomic structure of a metal. Give an example.
(b) Differentiate between annealing and normalizing.
(c) Write phase rule. Give equation.
(d) What is packing efficiency of an atom?
(e) State the basic objective of the surface hardening processes.
(f) What are the basic purposes for conducting the tensile test on engineering materials?
(g) Define the phenomenon of slip.
(h) What is crystal imperfection, define?
(i) State the general principles of phase transformation.
(j) What is Hardenability?

Section-B

2. (a) What is a crystal lattice? Define a unit cell.
(b) Explain the term of crystallography.
3. (a) Classify the engineering materials?
(b) Explain the behavior and physical properties of two engineering materials (e.g. plastic, composite)
4. Explain time temperature transformation curve with the help of a diagram showing temperature and transformation time range.
5. (a) Explain the term martensitic transformation in steel.
(b) List the defect in hardening and their remedies.
6. Explain preferred orientation. Draw simple sketch in support of random orientation and preferred orientation and differentiate between two.

Section-C

7. (a) Explain the following with the help of graph showing temperature and percentage of carbon range: (i) Tempering process, and (ii) Hardening process
(b) Define heat treatment process.
8. Draw iron carbon equilibrium diagram showing different zones of liquid and solid solution with their temperature and percentage of carbon content range. Explain the iron-carbon diagram in detail. Write its importance in the processing of ferrous materials.
9. (a) Write short notes on the following: (i) twinning (ii) Dislocation (iii) Re-crystallization.
(b) State the effect of Mn on the properties of alloy steel.