Title of Course: Engineering Materials
Course Code: MEC406
L-T Scheme: 3-0 **Course Credits: 3**

Course Contents:

Unit 1:
Crystal Structure:. Crystal structure of metals, crystal lattice of (i) Body centered cubic (ii) Face centered cubic (iii) Closed packed hexagonal, crystallographic Notation of atomic planes and Directions (Miller Indices), polymorphism and allotropy, Crystal imperfection.

Unit 2:
Plastic Deformation of Metals and Alloys: Mechanism of elastic and plastic deformation, role of dislocation; slip and twining. Elementary treatment theory of work hardening, Theories of recrystallization and grain growth, Creep and Fatigue, Hardness: Rockwell, Brinell and Vickers and their relation to strength.

Unit 3:
Phase and Phase Equilibrium: Solidification of alloys, Phase Diagrams, relationship with structure and properties; Eutectic systems. Iron Carbon alloys, Iron-Carbon equilibrium diagram Effects of alloying elements in steel.

Unit 4:
Heat Treatment of Alloys: Phase transformation in steel. 'S' Curves, Detailed study of various heat treatment Processes- hardening, annealing, tempering, Austempering and Martempering Case hardening, Hardenability, Precipitation hardening, Heat treatment Furnaces.

Unit 5:
Classification of Metals and Alloys-compositions, general properties and uses, Ferrous alloys, Non-ferrous alloys, Low alloy steels, Stainless steel, Magnetic materials for high and low temperature service. Brasses and bronzes; Aluminum base alloys. Bearing Materials, Polymers & Elastomers, Ceramic Materials ,Composite materials. Introduction to non-destructive testing (NDT), Introduction to corrosion, Introduction to various standards used in industry for testing.

Text Book:

1. Donald R Askeland and Pradeep, P.Phule (2006), The Science
2. Engineering of Materials for Science and Engineering, 5th edition

References

1. Materials Science and Engineering by W.D. Callister and adapted by R.Balasubramaniam,Willey India, 2010 Ed.
2. Engineering Materials: properties and selection by Budinski&Budinski,9thEd.,Prentice HallIndia
3. Engineering Materials and Metallurgy byR.Srinivasan, 2ndEd.,TataMcGrawHill.
4. Materials & Processes in Manufacturing by E. P. Degarmo and adapted by Black & Kosher, 10thEd.,Wiley India.
5. Materials Science and Engineering by V. Raghavan, 5thEd.,Prentice HallIndia.