

## PC207 MATERIALS SCIENCE & ENGINEERING

CREDITS: 5 (L = 4, P = 2)

1. Introduction : Crystal geometry and structure; space lattice; unit cell; crystal systems; atomic packing; coordination number; crystal structures for metallic elements (BCC, FCC, HCP). Bonds in solids; types of bond and mechanisms of bond formation; ionic, covalent and metallic bonds and their comparison; secondary and mixed bonds; bonding and the properties of materials.
2. Polymers : Mechanisms of polymerisation; additions in polymers; polymer structures; Plastics, elastomers and rubbers; fibers and filaments; composite materials. Single crystals; agglomerated structures. Ceramics and ceramic-metal alloys.
3. Thermophysical and mechanical properties of materials such as ferrous and non-ferrous metals, alloys, polymers, composites and ceramics; their structural behavior in regard to axial, flexural, stiffness, torsional, shear, hardness, impact and fatigue strengths; creep phenomenon; corrosion; principal stresses and strains.
4. Structural properties of materials under load, and their suitability in various applications.
5. Design of simple structures such as beam, column, thin and thick cylinders under pressure. Design concepts for mould design and fiber-reinforced plastics.
6. Corrosion and its effect on material properties.

### REFERENCE BOOKS:

1. *Narula, Narula and Gupta*  
*Materials Science*  
*Tata McGraw Hill*
2. *Junnarkar and Shah*  
*Mechanics of Structures vol. I*  
*Charotar Publishing House*
3. *Lawrence H van Vlack*  
*Elements of Materials Science*  
*Addison Wesley*