

MATERIALS SCIENCE

Unit I Chemical Bonds

Review of Atomic structure – Interatomic Forces – Different types of chemical bonds – Ionic covalent bond or homopolar bond – Metallic bond – Dispersion bond – Dipole bond – Hydrogen bond – Binding energy of a crystal – Elastic properties.

Unit II Modern Engineering Materials

Classification of Polymers – Ceramics – Super strong materials – Cermets – High temperature materials – Thermo electric materials – Electrets – Nuclear engineering materials.

Unit III Non Destructive Testing:

Radiographic methods – Photo elastic method - Magnetic methods – Electrical methods – Ultrasonic methods – Visual and other optical methods – Thermal methods – Surface defect detection by NDT – Equipments used in non destructive testing – Metallurgical microscope – Election microscope – Coolidge x-ray tube – Production of ultrasonic waves – Magnetostriction Ultrasonic generator - Pilzo electric ultrasonic generator.

Unit IV New Materials

Metallic glasses – Fibre reinforced plastics – Metal matrix composites – Material for optical sources and detectors – Fiber optic materials and their applications – Display materials – Acoustic materials and their applications – SAW materials – Biomaterials – High temperature superconductors.

Unit V Mechanical Behavior of Materials

Different mechanical properties of Engineering materials – Creep – Fracture – Technological properties – Factors affecting mechanical properties of a material – Heat treatment - cold and hot working – Types of mechanical tests – metal forming process – Powder – misaligning – Deformation of metals – Bauschinger effect – Elastic after effect – Deformation of crystals and poly crystalline materials.

Reference

1. Materials Science by M.Arumugam, Anuradha Publishers. 1990 Vidayalkaruppur, Kumbakonam.
2. Materials Science and Engineering V.Raghavan Printice Hall India Ed. V 2004. New Delhi.