

Introduction to Materials: Metals Properties - Thermal Treatments on metals -Strengthening by alloying, work hardening, oligo elements, Strengthening by thermal treatments, and order disorder transformation.Ceramics - Properties - Bio active ceramics - Ceramic and polymeric carbons - Biological glasses – Coatings - A Survey on the Adhesion of Ceramic to Bone Tissue.Composites – Classifications – Properties –Testing On Composite Materials - Ultrasonic techniques, Sensing of deformation and damage (health monitoring) - Environmental Effects - Applications of Composites.

Biomaterials and its properties: Definition - classification of bio-materials, Metallic implant materials, Co- Ti-based alloys, ceramic implant materials, aluminum oxides, hydroxyapatite-glass ceramics - medical applications. Implementation problems - inflammation, rejection, corrosion, structural failure. Surface modifications for improved compatibility. biological effects of implants.Mechanical properties, visco elasticity, wound-healing process, Application of biomaterial for the human body., body response to implants, blood compatibility.

Characterization techniques: X-ray diffraction and molecular structure – EDAX- Nuclear Magnetic Resonance – Scanning tunneling microscope – Atomic force microscopy –SEM – TEM – optical tweezers – spectroscopy methods differential thermal analysis, Laser Raman spectroscopy, FTIR, differential thermo gravimetric analysis – NDT methods.

Applications: Materials for bone and joint replacement –dental metals and alloys – dental restorative materials – dental amalgams.– cardiovascular materials – cardiac prosthesis; vascular graft materials – cardiac pacemakers – cardiac assist devices – materials for ophthalmology contact lens – intraocular materials – materials for drug delivery. Nano Biomaterials -matrix and filler materials

TEXT BOOKS / REFERENCES:

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3. H. H. Willard, L. L. Merritt, J. A. Dean and F. A. Settle, Instrumental Methods of Analysis, CBS Publishers, New Delhi, 1986.
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1. Rodney M J Cotterill, Biophysics an introduction, John Wiley & sons Ltd., NY, 2002