**SS 811 BIOMATERIALS AND ITS APPLICATIONS 3-1-0-4**

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.

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.

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.

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 – intraoccular materials – materials for drug delivery. Nano Biomaterials -matrix and filler materials

**TEXT BOOKS/REFERENCES:**


1. D. F. Williams (Editor), "*Material Science and Technology - A Comprehensive Treatment*", Vol. 14, Medical and Dental Materials, VCH Publishers Inc., New York, 1992.
2. Jonathan Black, "*Biological Performance of Materials, Fundamentals of Biocompatibility*", Marcel Dekker Inc., New York, 1992.
3. H. H. Willard, L. L. Merritt, J. A. Dean and F. A. Settle, "*Instrumental Methods of Analysis*", CBS Publishers, New Delhi, 1986.
4. Vasantha Pattabhi and N.Gautham, "Biophysics", A*lpha science International Ltd*. UK, 2002
5. Rodney M J Cotterill, "*Biophysics - An Introduction*", John Wiley & sons Ltd., 2002
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