

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Biomedical Science)
Semester: IV
Syllabus with Effect from: June - 2014

Paper Code: PT04CBMC02	Total Credit: 4
Title of Paper: Advanced Biomaterials & Related Anatomy	

Unit	Description in Detail	Weightage (%)
I	Types of Biomaterials: Structure and property relationships in materials, ceramics and polymers; Collagen, hyaluronic acid and other biopolymer applications, Interactions of materials with the human body; Influence of microstructure and environment on fatigue and fracture of materials. Composite materials concepts and applications; Whiskers and fibres medical applications such as structures, orthopedic implants, artificial organs, dental materials. Biodegradable block copolymers and their applications for drug delivery	25%
II	Biomaterials and Implementation: Implementation problems - inflammation, rejection, corrosion, structural failure. Consists of biomaterial applications and tissue engineering for artificial organs, Types of biomaterials and their applications for the human body, Issues of biocompatibility and its evaluation, Surface characterization of biomaterials, biomaterial-blood (bio-fluid) interface, Surface modifications for improved compatibility	25%
III	Biomaterials in Different Systems: Cardiovascular implant biomaterials: artificial heart valves, Mechanical and bio-prosthetic valves, materials used, criteria required for fulfillment of physiological functions, Vessel grafts, Endothelial cell seeding as a surface modification of biomaterials. Orthopaedic implant materials: temporary external fixators, Materials for reconstruction of cartilage. ligaments and tendons, Bone replacement and bone cement, Artificial joint replacement, prosthesis and orthotics. Ophthalmology: Artificial cornea, contact lenses, intra-ocular lenses, artificial aqueous and artificial vitreous humour, artificial tears, artificial tympanic membrane	25%
IV	Applications of Advanced Biomaterials: Skin replacements: Properties of skin, Wound dressings, artificial skin; facial implants: Dental implants: dental restorative materials, implanted dental interfaces, denture resins and cements; artificial red blood cells; artificial body fluid: artificial lung surfactants, artificial saliva, artificial synovial fluid; dialysis membranes, artificial liver, artificial pancreas; Artificial neural implants: materials used, criteria for selection and design. conducting polymers and their applications in reconstruction and regeneration of neuronal, muscle and cardiac cells.	25%

Basic Text & Reference Books:-

- Park J., Lakes R. S. Biomaterials: An Introduction, Springer publications
- Hollinger J. O. An Introduction to Biomaterials, CRC Press
- Oechsner A., Silva L. F. M., Altenbach H., Springer Publications
- Basu B., Katti D. S., Kumar A., Advanced Biomaterials: Fundamentals, Processing and Applications, Wiley Publications
- Advances in Biomaterials Science and Biomedical Applications, Edited by Pignatello R., Intech Publishers
- Burdick J. A., Robert L., Biomaterials for Tissue Engineering Applications, Springer Publications

