BMPE3011 ARTIFICIAL ORGANS & IMPLANTS (3-0-0)

Module I

Introduction to Artificial Organ Design: Substitutive Medicine, Out Look for replacement, Design Consideration, Evaluation process & basic concepts of Kidney & liver transplant Cardiac Assist Devices Design: Steps in Engineering Design, Detailed steps in Engineering Design of artificial heart & circulatory assistive devices. (Text Book –I – Section VI -Chapter -63 & Text Book III- Chapter 15)

Module II

Cardiac Valve Prostheses: Brief history valve prostheses: Mechanical Valves & Tissue Valves. Current Types of prostheses, Tissue verses Mechanical valves, Medtronic-Hall-Tilting disc valve, St.Jude Medical Bileaflet valve, Carpentier Edwards Porcine valve (model 2625) , Hancock Modified Orifice Porcine valve (model 250), Carpentier-Edwards pericardial Valve (Model 2900), Implication of Thrombus Deposition, Durability : Wear, Fatigue, Mineralization and Current Trends in Valve Design. (Text Book –I – Chapter – 64)

Module III

Artificial Kidney: Brief Review of Structure & Function of Kidney, Changes in the Body Fluids in renal Diseases. Principle of Dialysis in Artificial Kidney, Dialyzers: Parallel Flow Dialyzer, Coil-Hemodialzer, Hollow-Fiber Hemodialzer. Performance analysis of the dialzers, Block diagram description of Hemodialysis machine. (Text Book – II –Chapter 30) Introduction to Design & working of Artificial Liver & Pancreas (Text Book –I)

Module IV

Implants: General concepts of Implants, classification of implants: Soft tissues replacements and Hard tissue replacements. Body Response to Implants: Cellular Response to Implants, Systemic Effects by Implants, Blood Compatibility & Factors affecting blood compatibility.

Module V

Brief Study of Percutaneous & Skin implants, Ear & Eye Implants like Corneal Implants & Cochlear Implant. (Text Book –III – Chapter – 10 & 11)

1. Biomedical Engineering Hand Book 3rd Edition (Tissue Engineering & Artificial Organs) – Joseph D. Bronzino- CRC- Tylor & Francis-2006.
2. Hand Book of Biomedical Instrumentation -2nd Ed- R.S.Khandpur - TMH 2003.
3. Biomaterials –An Introduction 3rd Ed– Joon Park & R.S.Lakes- Springer- 2007.