PEI302: BIOMECHANICS AND REHABILITATION

L	T	P	Cr
3	0	0	3.0

Course Objectives: To understand the concepts of Biomechanics, to enable to apply biomechanics for rehabilitation

Introduction: Introduction to Biomechanics, Movements of the body, Skeletal System, Naming characteristics that describe muscle features, Muscular system, Regional anatomical kinesiology.

Scope of Mechanics in Medicine: Orthopedics, Cardiology, Exercise Physiology, Surgery, Biomechanics in Orthopedics: Principles, Introduction to the structure and mechanics of the musculoskeletal system, Application of mechanics to bone, Tendon, Ligaments and other biological materials, Definition of biological tissue and orthopaedic device mechanics.

Engineering Concepts in Rehabilitation Engineering Anthropometry: Methods for Static and Dynamic Measurements: Area Measurements, Measurement of Characteristics and Movement, Measurement of Muscular Strength and Capabilities, Measurement Tools and Processes in Rehabilitation Engineering: Fundamental Principles, Structure, Function, Performance and Behaviour. Engineering Concepts in Sensory Rehabilitation Engineering: Sensory Augmentation and Substitution, Visual System, Visual Augmentation, Tactual Vision Substitution and Auditory Vision Substitution, Auditory System: Auditory Augmentation, Audiometer, Hearing Aids, Cochlear Implantation, Visual Auditory Substitution, Tactual Auditory Substitution, Tactual System.

Orthopedic Prosthetics and Orthotics in Rehabilitation: Engineering Concepts in Motor Rehabilitation, Applications. Intelligent Prosthetic Knee, A Hierarchically Controlled Prosthetic Hand, A Self-aligning Orthotic Knee Joint, Externally Powered and Controlled Orthotics and Prosthetics, FES Systems–Restoration of Hand Function, Restoration of Standing and Walking, Hybrid Assistive Systems (HAS).

Active Prostheses: Active above knee prostheses, Myoelectric hand and arm prostheses: Different types, Block diagram, Signal flow diagram and functions.

Course learning outcome (CLO): After the completion of the course the students will be able to

1. Apply Orthopedics, Cardiology, Exercise Physiology, Surgery, Biomechanics in Orthopaedics
2. Engineer rehabilitation engineering anthropometry
3. Use sensory rehabilitation engineering concepts.
4. Rehabilitation using orthopedic prosthetics and orthotics in
5. Handle applications of active prostheses.

Recommended Books:

1. *Bronzino and Joseph, Handbook of Biomedical Engineering. CRC Press (2004).*
2. *Ghista, D.N., Orthopedic Mechanics, Academic Press (2008).*
3. *Horia-Nocholai, T. and Jain, L.C., Intelligent Systems and Technologies in Rehabilitation Engineering, CRC Press (2001).*
4. *Park, J.B., Bio-materials: Science and Engineering, Springer (1984).*
5. *Robinson C.J, Rehabilitation engineering, CRC Press (2006).*

Evaluation Scheme:

Evaluation Elements	Weightage (%)
MST	30
EST	50
Sessionals (May include Assignments/ Projects/ Tutorials/ Quizes/ Lab Evaluations)	20