Course code	Course Name	L-T-P-Credits	Year of Introduction
BM402	BIOMECHANICS & DESIGN OF MEDICAL DEVICES	3-0-0-3	2016

Prerequisite : Nil

Course Objectives

- To understand the structure and composition of various types of tissues
- To introduce the concepts of cardiovascular biomechanics
- To discuss various implants and their design considerations
- To have an understanding of various kinds of assistive and monitoring devices.

Syllabus

Bone & collagen rich tissues, Total Hip Prosthesis, Human locomotion & gait analysis, Muscle mechanics, Biomechanics of spine, Fracture Mechanisms, Spirometers, Tonometers, Cardiovascular biomechanics.

Expected Outcome

At the end of the course the student will be able to

i. Understand the structure property relationship of various kinds of tissues
ii. Understand the basics of cardivascular biomechanics
iii. Get an idea of the design considerations and issues of the use of implants and assistive devices.

Text Books:

1. D N Ghista , *Biomechanics of Medical Devices* , Macel Dekker , 1982
2. J B Park , *Biomaterials - Science and Engineering*, Plenum Press , 1984

Reference Books:

1. Alexander R Mc Neill *, Biomechanics*, Chapman and Hall, London, 1975
2. A Z Tohen and C T Thomas , *Manual of Mechanical Orthopaedics*" ,1973
3. D N Ghista and Roaf , *Orthopaedic Mechanics*, Academic Press,1978
4. VC Mow and W C Hayes *Basic Orthopedic Biomechanics*, Lippincott – Raven publishers,1997.
5. C. G. Caro, T. J. Pedley, R. C. Schroter, W. A. Seed, 2011, The mechanics of the circulation, Oxford University Press, 2nd Edition.
6. Fung Y. C., 1984, Biodynamics: Circulation, Springer Verlag

Course Plan

Module	Contents	Hours	Sem. Exam Marks
I	Bone & collagen rich tissues- structure & composition Properties of bone: mechanical properties anisotropy, viscoelasticity- electric properties. Viscoelastic properties of bone-models –Maxwell &Voight- analysis	4	
	Structure and functions of cartilages, tendons, ligaments- mechanical properties of collagen rich tissues	2	**(15%)**

Course code	Course Name	L-T-P-Credits	Year of Introduction
BM431	CLINICAL INSTRUMENTATION LAB	0-0-3-1	2016

Prerequisite: BM403 Therapeutic equipment

Course Objectives

- To acquaint with the operation and working principles of various biomedical instruments, surgical procedures and clinical instrumentation.

List of Exercises/ Experiments (Minimum 12 are mandatory)

1. Power amplifier circuit of Stylus movement
2. Chart Drive circuit.
3. QRS Detector circuit.
4. Automatic gain compensation circuit.
5. Time gain compensation circuit.
6. ESU waveform generator.
7. Study of IC 7107.
8. Study of various electrodes for data acquisition of Bio-signals
9. Study of multiparameter physiological recorders.
10. Spectrophotometer - Study, Standardization & Calibration.
11. Colorimeter - Study, Standardization & Calibration.
12. Flame photometer- Study, Standardization & Calibration.
13. ECG Machine – Study & Calibration.
14. Study of Electrosurgical unit
15. Study of ventilator & x-ray radiography system (Demo)
16. Study of ultrasound waves – Ultrasound transmitter & detector (Demo)
17. Circuit designing and PCB fabrication using simulation software
18. Study of Electrical safety analyzers

Equipments needed: Multimeters, function generators, CROs, power supplies, physiological recorders, ECG Machine, EEG machine, ESU unit, Ventilator unit, X-Ray equipment, Colorimeter, spectrophotometer, ultrasound transducers, Electrical safety analyzers.

Expected Outcome

At the end of the course the student will be able to

i. Identify and calibrate various clinical instruments
ii. Trouble shoot and service biomedical equipments for its improved working

Text Book:

1. R S Khandpur, Handbook of Biomedical Instrumentation by, 3rd Edition, McGraw Hill Publishers
2. Joseph J. Carr, John M. Brown, Introduction to Biomedical Equipment Technology, Pearson Education (Singapore) Pvt. Ltd., 2001.