Course Title, Introduction to Biomedical Engineering

1. Details of course are as under: -

a. Programme: BE Mechatronics Engineering

b. Title: Introduction to Biomedical Engineering

c. Course Code: MTS-317

d. Credit Hours: 3 – 0

Course Objective

2. The course provides an introduction to undergraduate students related to Biomedical Engineering. Topics include basic biomechanics, biomedical imaging, biomaterials, biomedical instrumentation and sensors, and biomedical device design regulatory requirements

Course Contents (Theory)

3. The course contents are as under:

Week	Contents
Week 1	Introduction to main branches of biomedical engineering including Bioinstrumentation, Biomaterials, Biomechanics, Medical Imaging, Medical Signal Processing, Rehabilitation Engineering and Bioinformatics.
Week 2	Introduction to mechanical, neuromuscular, and anatomical bases of human movement. Explanation of the anatomy and physiology of the Human Body in terms of different applications of the biomedical engineering.
Week 3-4	Introduction to biomechanics and application of proper anatomical and biomechanical terminology associated with body structures.
Week 5	Basics of biomaterials and biocompatibility
Week 6	Introduction to bioelectricity and biopotentials in terms of a human body

	system
Week 7	Basics of biosensors and bioinstrumentation with an overview of instrumentation systems used in clinical medicine and biomedical research
Week 8-9	Introduction to Biomedical Signals, providing biomedical signal processing background on technical aspects and presenting the relationships among different theoretical measures of biomedical signals
Week 10	Basics of medical imaging, image formation and reconstruction, processing, analysis and interpretation.
Week 11-12	Introduction to biomedical devices (diagnostic and therapeutic) with an insight into working of the biomedical devices by integration of knowledge from previously taught topics.
Week 13-14	Basics of rehabilitation with an introduction to engineering principles underlying the design, fabrication and utilization of devices for persons with disabilities.
Week 15	Case study on application of biomechanics, biopotentials, bioinstrumentation in Biomedical engineering
Week 16	Understanding the basics of professional and ethical conduct in Biomedical Engineering with an insight into major “problem areas” that are widely debated in these fields including the ethics of medical research and regulatory processes.

Course Learning Outcomes

4. Upon successful completion of the course, the student will demonstrate competency by being able to:

a. Understand, the basics of biomechanics, bioinstrumentation, biomaterials, artificial organs, medical imaging, clinical engineering, modelling of

biological systems, and apply these concepts in order to solve elementary problems in the field of biomedical engineering.

b. Development of framework for biocompatibility of biomedical device.
c. Investigate the origin of physiological signals in human body.
d. Understanding the biomedical product life cycle of biomedical devices in context of environmental sustainability.
e. Demonstrate an understanding of professional and ethical conduct in biomedical engineering.

Course Targets and OBE Mapping

CLO No.	**Outcomes**	**Level of Learning**	**PLO**
1	Understand, the basics of biomechanics, bioinstrumentation, biomaterials, artificial organs, medical imaging, clinical engineering, modelling of biological systems, and apply these concepts in order to solve elementary problems in the field of biomedical engineering	C3	3
2	Development of framework for biocompatibility of biomedical device	C4	3
3	Investigate the origin of physiological signals in human body	C4	4
4	Understanding the biomedical product life cycle of biomedical devices in context of environmental sustainability	C2	7