GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Bio – Medical Engineering

Subject Name: **Therapeutic Instrumentation**
Subject Code: **160303**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
4	0	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	DC Defibrillator: need and circuit description. Rectangular wave defibrillator, electrodes used. DC defibrillator with synchronizer, cardioverter. Performance aspects of DC defibrillator. Implantable defibrillator and defibrillator analyzers.	8
2.	Dialysers: Principle of dialysis, artificial kidney, function and working of dialyser, parallel flow dialyser, coil hemodialyser, hollow fiber hemodialyser. Performance analysis of dialysers, membranes used for hemodialysis. Block diagram and working of hemodialysis machine. Blood leak detector, portable kidney machine –working and flow diagram.	6
3.	Principle of surgical diathermy. Electrosurgical equipments and techniques. Electrotomy, fulguration, coagulation, dessication. Electrosurgery units, spark gap valve, solid-state generator. Construction and working of surgical diathermy machine, electrodes used. Safety aspects like burns, high frequency current hazard, and explosion hazard, operating principle of surgical diathermy analyzer.	6
4.	Basic concepts about LASER. LASER coherence. Its principle of operation, properties, gain medium, pumping mechanism and resonator design. Types of LASER: pulsed ruby laser, ND YAG laser, argon laser and CO2 laser. Applications of laser in medicine: control of gastric hemorrhage by photocoagulation, retinal detachment.	8
5.	Short-wave, diapulse, and microwave, ultrasonic therapy: circuit description, application and dosage control. Electrotherapy: diagnosis, electrical stimulation for pain relief, apparatus and current waveforms, electrodes. Spinal cord stimulator and cerebral stimulation.	8

6.	Neonatal instrumentation: Incubator : physiological heat balance, heat production and heat loss methods. Apnea detection. Photo therapy devices.	6
7.	Anesthesia machine: Gas supply and delivery, vapor delivery. Patient breathing circuit. Complete schematic of anesthesia machine.	6
8.	Cardiovascular and vascular surgery, catheters, heart lung machine, octopus, monitors, coronary angiography, balloon angiography, stents.	8

The Practical and Term work will be based on the topics covered in the syllabus.

Text Books:

1. Handbook of biomedical instrumentation R.S. Khandpur PUB: Tata Mcgraw- New Delhi
2. Introduction to biomedical equipment and technology Carr and Brown, Pearson Education- Asia
3. Medical instrumentation, John Webster. PUB: John wiley and sons-New York.