

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN BIO-MEDICAL ENGINEERING

SEMESTER: V

Subject Name: **Therapeutic Medical Instrumentation**

Sr. No.	Course Content
1.	Thermo and Laser Therapy: 1.1 Physics of IR & UV , Effect of IR & UV on human body, hyperemia, pain relief through IR & UV. 1.2 Construction & working of IR lamp. 1.3 Construction, assembly, circuit and principle of operation of UV lamp. 1.4 Application of lasers on human body, He -Ne & diode lasers, safety Aspects
2.	Ultrasound Therapy & Short Wave Diathermy: 2.1 Effect of ultrasound on human body 2.2 Construction of ultrasound therapy transducer 2.3 Technical specifications, circuit diagram & principal of operation of ultrasound therapy machine 2.4 Effect of SW on human body, capacitive & inductive field, applications techniques 2.5 Technical specifications, circuit diagram and principle of operation of short wave diathermy
3.	Electrotherapy: 3.1 Effect of electric current on nerves & muscles, stimulation of nerves & muscles. 3.2 Application techniques of electrotherapy, technical specifications, circuit diagram, principle of operation of nerve & muscle stimulator. 3.3 Principle of interference therapy.
4.	Traction & CPM (Continuous Passive Motion): 4.1 Need of traction unit 4.2 Construction, block diagram, principle of operation of cervical & lumber traction units. 4.3 Continuous passive movement, introduction to knee & shoulder CPM units.
5.	Electro Surgery: 5.1 Effect of electric current on human tissue, principle of electro surgery, unipolar & bipolar modes. 5.2 Methods of cutting & coagulation. 5.3 Technical specifications, circuit diagram & principle of operation of Valve type cautery. 5.4 Principle, technical specifications, block diagram of solid-state cautery machine. 5.5 Patient's safety in cautery machine. 5.6 Different types of cutting & coagulation electrodes
6.	Infusion Pump: 6.1 Types of infusion pumps. 6.2 Working principle , constructional block diagram 6.3 Applications

7.	Dialysis Machine: 7.1 Need, type & Principle of dialysis. 7.2 Artificial kidney, 7.3 Function and working of dialyzer, Block diagram and working of hemo dialysis machine. Blood leak detector, portable kidney machine –working and flow diagram.
8.	Neonatal Therapy (Incubator): 8.1 Physiological heat balance, heat production and heat loss methods, phototherapy devices.

Laboratory Experiences:

1. To perform Testing & study of UV lamp & its circuit.
2. To Study the construction of ultrasound therapy transducer.
3. To verify Performance testing of ultrasound therapy machine & study of its circuit.
4. To perform application technique of short wave diathermy in condenser/ inductive fields & its controls.
5. To observe various waveforms of nerve & muscle stimulator on dummy patient.
6. To demonstrate performance of electrodes of Electro-surgical Unit (ESU).
7. To verify the Performance testing of ESU on dummy patient with unipolar & bipolar modes.
8. To verify Performance testing of Generation & testing of coagulation/cutting waveforms of solid-state cautery.
9. To verify performance testing generation of IG & faradic waveforms using electronic circuit.
10. To verify Performance testing of Generation of 1MHz frequency waveform for ultrasound therapy using electronic circuit.
11. To demonstrate the performance of Infusion pump.

Reference Books:

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