

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology				Branch/Spec.	Biomedical Engineering			
Semester	VII				Version	2.0.0.0			
Effective from Academic Year	2017-18		Effective for the batch Admitted in			July 2017			
Subject code	2BM703	Subject Name			Therapeutic Techniques & Instrumentation				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	-	1	-	4	Theory	40	60	100
Hours	3	-	2	-	5	Practical	25	25	50
Pre-requisites: Good Knowledge of Human Biology and basic electronic principles.									
Learning Outcome: The educational objectives of the course are to educate students to attain the following:									
<ul style="list-style-type: none"> • Understand basic principle and machine parts of pacemaker machine • Understand basic principle and machine parts of dialysis machine • Awareness of various working modes and principle of ventilators • Understand the working of anaesthesia machine and stimulators 									
Theory syllabus									
Unit	Content								Hrs.
1	CARDIAC PACEMAKER Need for pacemaker, External Pacemakers, Implantable Pacemakers- Types of Implantable Pacemakers, basic requirements of implantable circuit; programmable pacemaker, classification codes ICHD and NASPE / BPEG generic code for pacemaker, Leads and Electrodes: Lead components, Unipolar and Bipolar leads , Active and passive fixation; Power Source for pacemaker.								6
2	DEFIBRILLATOR Principle and circuit description, Rectangular wave defibrillator, defibrillator electrodes, basic principle and comparison of output wave forms of different DC defibrillator, energy requirements, synchronous operation, cardioverter, Performance aspects of DC defibrillator. Implantable defibrillator and defibrillator analyzers, defibrillator safety.								8
3	DIALYSERS Principle of hemodialysis, ultra-filtration phenomenon, artificial kidney, peritoneal dialysis, hemofiltration, function and working of dialyzer, Types of Dialyzer: parallel flow, coil, hollow fiber; Block diagram and working of hemodialysis machine; composition of dialysate, Circuits: dialysate temperature control and blood leak detector, portable kidney machine –principle of using sorbent compounds for dialysate regeneration.								7
4	SURGICAL DIATHERMY Principle of surgical diathermy, electrosurgical equipments and techniques, Electrotomy, fulguration, coagulation, desiccation, Electro surgery units, spark gap valve, solid-state generator, Construction and working of surgical diathermy machine, electrodes, Safety aspects like burns, high frequency current hazard, and explosion hazard, operating principle of surgical diathermy analyser.								5
5	PHYSIOTHERAPY AND ELECTROTHERAPY EQUIPMENTS Short Wave Diathermy, Micro Wave Diathermy, Diapulse Therapy unit, Ultrasonic Therapy unit, Different current waveforms used in electrotherapy, Interferential Current Therapy, Transcutaneous Electrical Nerve Stimulator (TENS), Spinal Cord Stimulator, Bladder Stimulators.								4
6	VENTILATOR AND ICCU INSTRUMENTATION Basic principles of ventilators, Classification of positive pressure ventilators, Different volume and pressure controlled modes with pressure-volume-flow diagrams: Control, Assist control, CPAP, Bi-PAP, PEEP, IMV, SIMV, I: E ratio. High frequency ventilators.								7
7	NEONATAL INSTRUMENTATION Incubator/Baby Warmer, Apnea detection.								2
8	ANESTHESIA MACHINE AND DRUG DELIVERY SYSTEM Complete schematic of anaesthesia machine, Gas supply and delivery system, Designing and component of vaporizer, Patient breathing circuit, Humidifiers.								6
Practical content: Term Work and Practical shall be based on the above syllabus.									
Text Books:									
1	Handbook of Bio-Medical Instrumentation, By R. S. Khandpur, Pub: Tata McGraw Hill.								
Reference Books									
1	Introduction to biomedical equipment and technology , By Carr and Brown, PUB: Pearson Education- Asia								
2	Medical instrumentation, By John Webster, PUB: John wiley and sons-New York.								