

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		2BM706		Subject Name		Clinical Engineering & Patient Safety					
Teaching scheme					Examination scheme (Marks)						
(Per week)		Lecture(DT)		Practical(Lab.)		Total		Total			
		L	TU	P	TW			CE	SEE		
Credit		3	-	-	-	-		Theory	40	60	100
Hours		3	-	-	-	-		Practical	-	-	-
Pre-requisites: Anatomy and Physiology, Medical Electronics, Basic Principle of Medical Equipment											
<b>Learning Outcome:</b> The educational objectives of the course are to educate students to attain the following: <ul style="list-style-type: none"> <li>• Understanding of Clinical engineering at hospital level</li> <li>• Understanding role of clinical engineer</li> <li>• Understanding of various models at hospital level</li> <li>• Understanding of radiation safety &amp; protection</li> </ul>											
Theory syllabus											
Unit		Content								Hrs.	
<b>Part – I Clinical Engineering &amp; Management</b>											
1	<b>HISTORY &amp; ROLE OF CLINICAL ENGINEERING</b> Organization of clinical engineering department in a hospital, Roles and functions of Clinical engineering in a Hospital, General safety rules in clinical environment								3		
2	<b>PATIENT SAFETY &amp; RISK MANAGEMENT MODEL</b> Factors causing various medical errors, Clinical Engineer: Well suited for patient safety, Root cause analysis (RCA), Health care failure mode analysis (HFMEA), JCAHO standards, Risk management: Its basics & process, Role of clinical engineer in Risk management								5		
3	<b>PATIENT - HOSPITAL AND MEDICAL DEVICE SAFETY PROGRAMS</b> Silver bullet model, Process analysis methodology, JCAHO environment of care, The safety committee in Hospitals and its role, Components of Hospital safety program, The system risk model (SRM), Description of SRM, Direct and root cause failure								5		
4	<b>CLINICAL INFORMATION MANAGEMENT SYSTEM AND ADVANCED DIAGNOSTICS</b> Clinical Information system (CIS), Physiological monitoring process, PMS and CMS architecture, Remote diagnostics using Technical assistance center and LAN network								5		
<b>Part – II Radiation &amp; Patient Safety</b>											
5	<b>CLINICAL RADIATION GENERATORS</b> Classification of X –rays on the basis of beam quality, Linear Accelerator, Betatron, Microtron, Heavy Particles Beam generator, C- 60 generators								5		
6	<b>QUALITY OF BEAM &amp; MEASUREMENT OF ABSORBED DOSE</b> Half value layer, Filters, Measurement of beam quality parameters, Radiation absorbed dose, Relation between kerma – exposure and absorbed dose, Calculation of dose from exposure								5		
7	<b>DOSE DISTRIBUTION AND SCATTER ANALYSIS</b> Phantoms, Depth dose distribution, Percentage depth dose, Tissue – Air Ratio, Tissue – Scatter Ratio								4		
8	<b>TREATMENT PLANNING: ISODOSE DISTRIBUTION</b> Isodose chart, Measurement of Isodose curves, Parameters of Isodose curves, Wedge filter, Isocentric techniques								6		
9	<b>RADIATION PROTECTION FOR THERAPEUTIC RADIATIONS</b> Dose Equivalent, Effective dose equivalent, Background radiation, Low level radiant effects, Effective dose limits, Structural shielding design								4		
10	<b>SAFETY FOR DIAGNOSTIC RADIATION &amp; ULTRASOUND</b> Radiation and clinical safety for X-Ray, CT Scan & MRI, Safety majors for ultrasonography.								2		
Learning Assignments: Assignments & Case studies shall be based on the above syllabus.											
Text Books:											
1	Clinical Engineering Handbook, Joseph F. Dayro, Elsevier Academic Press										
2	The Physics of Radiation Therapy, Faiz M. Khan, Lippincott Williams & Wilkins										
Reference Books											
1	Radiation Oncology Physics: A Handbook for Teachers and Students, E. B. Podgorsak, IAEA publication										
2	Clinical Engineering: Principles and Application in Engineering Series, Edited By: Yadin David, Joseph. D. Bronzino										