

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology			Branch/Spec.	Biomedical Engineering				
Semester	VIII			Version	2.0.0.0				
Effective from Academic Year	2017-18			Effective for the batch Admitted in	July 2017				
Subject code	2BM804	Subject Name		Lasers and Optics in Medicine					
Teaching scheme				Examination scheme (Marks)					
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	4	-	1	-	5	Theory	40	60	100
Hours	4	-	2	-	6	Practical	25	25	50
Pre-requisites: Good Knowledge of basic of LASER & Optical Physics.									
<p>Learning Outcome: The educational objectives of the course are to educate students to attain the following:</p> <ul style="list-style-type: none"> • Basic concepts of optical fibres and their properties. • Basic concepts of Laser fundamentals. • Medical applications of Lasers& Optics. 									
Theory syllabus									
Unit	Content						Hrs.		
1	OPTICAL FIBRES: STRUCTURE, WAVE GUIDE & FABRICATION Nature of light, basic optical law and definition, optical fiber modes and configurations, mode theory of circular wave guide, single mode fiber, graded, index fiber structure, fiber material & connections, fiber fabrication, mechanical property of fiber, fiber optics cable.						9		
2	SIGNAL DEGRADATION IN OPTICAL FIBERS Attenuation, Absorption, scattering losses, Bending losses, core and cladding losses, Signal distortion in fibers, polarization mode dispersion.						8		
3	OPTICAL SOURCES LED, Laser diodes, photo detectors.						7		
4	BASICS OF LASERS Basic concept about laser, laser properties, principle of operations, laser interactions with tissues, Types of lasers, Pulsed ruby laser, ND YAG laser, Argon laser, CO ₂ laser, He-Ne laser, Kr laser, semiconductor laser.						12		
5	THERAPEUTIC & DIOGNISTIC APPLICATION OF LASER & FIBER OPTICS Ophthalmology, Dermatology, Endoscopy, Bronchoscope, Gastro scope, Dentistry, Lithotripsy, Colonoscope, Cystoscope, laser & fiber optics application in surgery						8		
6	SAFETY AND STANDARDS Laser & Fiber optics standards, Potential hazards of laser, safety regulations and precautions, Medical surveillance						3		
7	OPTICAL TOMOGRAPHY & TECHNIQUES Optical coherence tomography, Elastography, Doppler optical coherence tomography, Application towards clinical imaging. In vitro clinical diagnostic, fluorescent spectroscopy, photodynamic therapy.						10		
Practical content: Term Work and Practical shall be based on the above syllabus.									
Text Books:									
1	Optical Communication By V.S.Bagad , Technical Publications.								
2	Hand book of Biomedical Instrumentation By: R S Khandpur Pub: Tata MC Grow Hill, Delhi								
3	Lasers & optical fibers in Medicine By: Abraham Katzir Pub: Academic Press								
Reference Books									
1	Mark E. Brezinski., Optical Coherence Tomography: Principles and Applications, Academic Press, 2006.								
2	Optical Fiber Communication By: Gred Keiser, 3 rd Edition Pub: MC Grow Hill International Edition								
3	Laser Applications in Medicine and Biology vol I,II,III Plenum Press, (1971 & 1974) by M.L. Wel Basht								
4	Introduction to Lasers and Their Application be Oshea callen and Rhodes, Addison Wesley-1977.								
5	Lasers in Photo medicine and photo Biology by E.D.RPratesi & C.A. Sachhi Springer								