

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	2BM701		Subject Name		Advanced Medical Imaging Techniques				
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 Physics. Fundamental of Medical Imaging – VI Semester Subject UIR.									
<p><b>Learning Outcome:</b> The educational objectives of the course are to educate students to attain the following:</p> <ul style="list-style-type: none"> <li>• Understanding of difference between conventional and digital equipment.</li> <li>• Understanding of non-ionizing radiation techniques.</li> <li>• Understanding of non-contact thermal imaging techniques.</li> </ul>									
Theory syllabus									
Unit	Content								Hrs.
1	<p><b>COMPUTED TOMOGRAPHY</b></p> <p>Conventional Tomography, Computed Tomography: Principle, Operational mode, CT System Components, Image Reconstruction Techniques: Basics of projection &amp; radon transform, back projection, filtered back projection, iterative reconstruction, image quality &amp; artifacts, clinical use &amp; biological effect &amp; safety, multislice CT , Spiral or Helical CT: Scan principle, scanner design, technique selection, Advantages and limitation of spiral CT</p>								12
2	<p><b>MAGNETIC RESONANCE IMAGING</b></p> <p><b>Magnetic Resonance Imaging:</b> Fundamentals of nuclear magnetic resonance, Fourier spectrum of NMR signal, spin density, relaxation times, pulse sequences.  <b>Generation &amp; Detection of NMR signals:</b> Magnetic field gradient, the NMR coil/probe, the transmitter and the receiver.  <b>Imaging Methods:</b> Data Acquisition, Spin echo imaging, Gradient echo imaging, imaging safety, clinical use</p>								14
3	<p><b>RADIO NUCLIDE IMAGING</b></p> <p>Fundamental of Radioactivity, generation and detection of nuclear emission, diagnostic method using radiation detector/probes, Radio Nuclide Imaging Systems: Rectilinear scanner, gamma camera, SPECT, PET, characteristics of Radionuclide Images, Internal radiation dosimetry &amp; Biological effects</p>								10
4	<p><b>INFRARED IMAGING</b></p> <p>Introduction and Applications of Infrared Imaging, Infrared photography.</p>								08
Practical content: <b>Term Work and Practical shall be based on the above syllabus.</b>									
Text Books:									
1	MRI -The Basics By: Ray H. Hashemi, William G Bradley, Christopher J Lisanti Pub.: Lippincott Williams & Wilkins								
2	Handbook of Biomedical Instrumentation By: R. S. Khandpur Pub.: Tata Mcgraw-hill								
Reference Books									
1	Fundamentals of medical imaging By: Paul Suctens, Pub: Cambridge University Press								
2	Principles of medical imaging By: K.Kirk Shung, Michael B. Smith and Benjamintui, Pub: Academic Press								
3	Radiologic science for technologists Physics, Biology and Protection, 6e, By: Stewart C. Busheng, Pub: Mosby								
4	Introduction to biomedical imaging By: Andrew Webb, Pub: IEEE press series : Wiley Interscience								