

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN BIO-MEDICAL ENGINEERING

SEMESTER: V

Subject Name: **Medical Imaging Technology**

Sr. No.	Course Content
1.	Basic Physics of Radiology: 1.1 Electromagnetic radiation, types of radiation, wavelengths and properties 1.2 Introduction to X-rays 1.3 X-ray spectrum, properties, production techniques
2.	X-RAY Techniques: 2.1 Fluoroscopy : Image, performance parameters, and operating system with feedback control, specifications 2.2 Radiography: Image, contrast & image quality, MA, KV & seconds controls
3.	X-RAY Equipment : 3.1 Types of X-ray tubes (Stationary & Rotating Anodes), construction & specifications, operation; X-ray tube rating - electrical & thermal. 3.2 X-ray generator (1Ø & 3Ø) supply frequency, high frequency generator 3.3 Control circuit: High voltage (kv), filament control & tube current (mA), exposure timing & switching, interlocks of circuits 3.4 X-RAY machine: X-ray tube, head assembly, grid & collimators, X-ray table, Bucky trays, cassettes, dark room, film processing., technical specifications and block diagram
4.	Catheterization Laboratory: 4.1 Typical instrumentation layout in a Catheterization laboratory, 4.2 pressure measurements and application
5.	Image Intensifier and Angiography: 5.1 Types of fluoroscopy, image intensifier, television camera, image recording on VHS/VCD , Block diagram of fluoroscopy system. 5.2 Angiography techniques, block diagram.
6.	CT & MRI: 6.1 Principles of CT, CT numbers, X-ray detection & data acquisition. Block diagram of CT machine. 6.2 Basic Physics of MRI- NMR, MRI image, MRI scanner, block diagram
7.	Ultrasound: 7.1 Introduction, properties of ultrasound & its limitations, Ultrasound transducer & its types (Sequential/linear & phased array transducers), pulse-echo technique 7.2 Ultrasound imaging: - <ul style="list-style-type: none"> • A-scan, B-scan, TM-scans & real time B-scan. 7.3 Technical specifications, block diagram of ultrasound scanner.

Laboratory Experiences:

1. To Demonstrate front panel control and operation of Xray machine
2. To Identify components of x-ray machine and interconnection
3. To Identify of different P.C.B cards and their function, testing, circuit tracing
4. To perform Fault finding in x-ray machine
5. To Develop x-ray films in dark room
6. To perform Demonstration of front panel and rear panel control and operation of Ultrasonic machine.
7. To Identify different PCB cards used in the ultrasonic machine
8. To demonstrate performance of different Ultrasonic probes (sector and electronic)
9. To perform Demonstration and operation of computercontrolled ultrasonic scanner (Color Doppler)
10. To perform Troubleshooting of various common faults in Color Doppler Machine
11. To perform Demonstration of working of CT scanners in Hospital
12. To perform Demonstration Demonstration of MRI in Hospital diagnostic center
13. To study General fault finding and trouble shooting technique

Reference Books:

1. Cheney's equipment for student radiographer- Peter Carter, Audry Paterson, Mike Thornton, Andrew Hyatt.
2. The physics of diagnostic imaging- A. Kenny, R. Eugene Johnnton.
3. Medical Electronics- A.G. Patil.
4. Introduction to physics of diagnostic radiology- Christen Sen's Thomas S. Curry Jamis E Dowdey Robert C.Murry.
5. Medical electrical equipment- Robert E. Molleoy.
6. Medical instrumentation application& design- John G. Webster, Eiditor.