16BM308 MEDICAL IMAGING TECHNIQUES

UNIT - I

BASIC MEDICAL IMAGING MODALITIES: X-ray, CT, Ultrasound, MRI, PET-CT, SPECT-CT, Gamma Camera, Catheterization Lab. Aspects of light imaging, convolutions and transforms, photometry lenses and depth of field, Image perception and 3D Imaging, Image acquisition, Display, Image processing operations, scanning & segmentation.

UNIT - II

BASIC CONCEPTS OF CT: Non-Spiral CT technology, Concepts of Spiral CT Scanner, Multi-Slice spiral technology, Various Peripheral devices. Applications: Multiplanar Reconstruction, Maximum Intensity Projection, 3D, CT Angio, Osteo, Dental, Perfusion (Body & Neuro), Virtual Endoscopy, Cardiac CT (Calcium scoring, Coronary Angiography, Lesion Quantification).

UNIT - III

MAGNETIC RESONANCE IMAGING: Permanent & Superconducting magnets, Signal generation, and detection, signal characteristics, signal localization, Fourier transforms in MRI, Imaging Reconstruction. Image artifacts. Coil technology, Parallel acquisition techniques, Various peripheral devices. Applications: Functional Imaging, Perfusion & Diffusion imaging (Echo planar imaging), Multi direction diffusion tensor imaging, Single & Multi Voxel Spectroscopy, MR Angiography, MRCP, Cardiac MRI (Myocardium viability, Valve function, etc.,), Flow Quantification.

UNIT - IV

ULTRASOUND SCANNER: Principles of Ultrasound, Basic Ultrasound instrumentation, Imaging techniques (A mode, B Mode, 2B, B/M, 4B, Gated Mode, 3D, 4D, M-Mode, Echocardiography), Image recording devices, Image artifact, Biological effects.

UNIT - V

GAMMA CAMERA: Physics of Gamma camera, basic Instrumentation, Imaging techniques, SPECT &Whole Body studies; Applications of Gamma camera in Cardiology, Nephrology, Neurology, etc., PET: Fundamentals of PET scanner & PET- CT, Crystal technology, Cyclotron principle, Hot Lab Equipment, Applications of PET; Cardiology, Neurology & Cardiology.