

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E –IIst SEMESTER–EXAMINATION – JULY- 2012****Subject code: 1723102****Date: 09/07/2012****Subject Name: Advanced Biomedical Imaging****Time: 10:30 am – 13:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain working of on site The Technetium generator and also derive equation for the radioactivity. **07**
(b) Explain basic Instrumentation of The Gamma Camera. **07**
- Q.2** (a) Explain The Anger Position Network used for estimating the location at which a particular r-ray strikes the scintillation crystal. **07**
(b) Explain working principle of the annihilation coincidence detection circuit used in PET. **07**
- OR**
- (b) Explain all corrections that apply for Image reconstructions in PET. **07**
- Q.3** (a) (1) Intensifying screens can be placed on both sides of the X-ray film or on one side only. Explain why double sided screens give higher image SNR, but single sided screens have a better spatial resolution. **03**
(2) Explain the construction of active matrix flat panel X-ray detectors. **04**
(b) Explain schematic of multi slice Spiral computed tomography including basic principle of data reconstruction. **07**
- OR**
- Q.3** (a) (1) Explain schematic of an instrumental setup used for dual energy x-Ray imaging. **04**
(2) Explain detectors that used for computed tomography. **04**
(b) What should be the modification required in Back projection method for Fan- beam reconstruction used in CT? **06**
- Q.4** (a) Give the basic idea about Ultrasonic Diagnostic scanning modes. **07**
(b) Explain schematic of thermal Imaging techniques with its clinical applications. **07**
- OR**
- Q.4** (a) Explain ultrasonic beam energy loss mechanisms in tissues. **07**
(b) Suppose that at 1 Tesla , the approximate T1 and T2 values of H2O and Fat are follows: **07**
For H2O T1=2500ms, T2=2500ms
For Fat T1=200ms, T2=100ms.
Calculate signal intensity ratio for H2O and Fat for the pulse sequence TR=500ms, TE= 25ms and Draw it graphically. Assume spin densities for these tissues are 100.
- Q.5** (a) Explain Inversion recovery Pulse sequence with its clinical applications. **07**
(b) Explain slice select gradient for MRI. How to change the slice thickness? **07**
- OR**
- Q.5** (a) Explain frequency encoding method used for Image construction in MRI. **07**
(b) Explain working principle of Magnetic Resonance Spectroscopy with its clinical applications. **07**
