

Time: 3 Hours

Marks: 80

- Note: 1) Question no 1 is compulsory
 2) Attempt any three questions from remaining five questions
 3) Figures to right indicate full marks

- Q.1 State true or false with reason 20
- CT number of lung tissue is positive number.
 - Interpolation is required in spiral CT to obtain the image.
 - Water suppression is not required in MRS to obtain metabolites spectrum.
 - T_1 relaxation time constant is longer than T_2 relaxation time.
 - Bandwidth of applied Radio Frequency determines thickness of slice for Imaging in Magnetic Resonance Imaging

- Q.2 a) Compare second and third generation of CT scanners with appropriate diagrams 10
- b) Obtain the projections of following image using ray by ray reconstruction 05

4	3
2	5

- c) Explain CT Number and state its significance. 05

- Q.3 a) Explain the formation of free induction decay signal and spin-echo pulse sequence in MRI. 10
- b) List the various detectors used in CT. Explain one of them in detail. 05
- c) A sample has a T_1 of 1.2 sec. If the net magnetization is set equal to zero, how long will it take for the net magnetization to recover its 80 % of equilibrium value? 05

- Q.4 a) Explain different types of CT artifacts. 10
- b) What is the energy of the photon that will be absorbed by a ^1H nucleus in a 1.5 Tesla magnetic field? 05
- c) Explain the biological effects of MRI. 06

- Q.5 a) Describe different types of pulse sequences used in MRS. 10
- b) Explain phase and frequency encoding in MRI with diagrams. 10

- Q.6 Write short note on 20
- Superconducting magnet in MRI
 - Slip ring technology in Spiral CT
 - MRS applications
 - PET-CT hybrid modality
 - Clinical Applications of MRI