YTIET/LIB/BM/SEM-VII/MI-II/26-11-2012

BiOMed = 54

P4-RT-Exam. Oct.-12-152

Con. 8399-12. KR-1095

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data.
(4) Assumption should be **clearly** stated.

1. State with reason whether following statements are **true** or **false** :– 20
   (a) Hounsfield no can have negative value.
   (b) Larmor frequency decreases as magnetic field strength increases.
   (c) T_1 and T_2 are time constants that dictates shape of the exponential recovery and decay of logitudinal and transverse magnetization respectively.
   (d) In spiral CT scanner, high pitch value increases the scan time.
   (e) TE is greater than TR in spin echo pulse sequence.

2. (a) Discuss the construction and detectors used in MDCT. Explain how MDCT is better than other generation of CT. 10
   (b) List and compare the various type of detectors used in CT. 10

3. (a) Explain the spin energy states of hydrogen proton. A hydrogen proton in magnetic field of 2 Tesla. Calculate the amount of photon energy required to swich from spin up to spin down state (Planck's constant = $6{\cdot}6 \times 10^{-34}$ J-Sec. Gyromagnetic ratio = $26{\cdot}8 \times 10^{7}$ MHz/T) 10
   (b) Discuss the safety parameters while performing MRI Scan. 10

4. (a) Explain any **two** parameters with respect to magnetic resonance spectroscopy :– 10
      (i) Chemical shift
      (ii) PRESS Sequence
      (iii) STEAM Sequence.
   (b) State clinical application of MR spectroscopy. 10

5. (a) Obtain the projection of the following image and reconstruct the image using ray by ray reconstruction technique – 10

3	7
1	5

   (b) Explain Algebric reconstruction technique with example. 10

6. (a) Explain slice selection frequency and phase encoding with help of MRI pulse sequence diagram. 15
   (b) A sample has T_1 of 1 sec. If net magnetization is set equal to zero, how long will it take for net magnetization to recover to 97% of its equilibrium value ? 5

7. Write short notes on (any **three**) : 20
   (a) Electrical Impedance tomography
   (b) Radon Transform
   (c) Compare CT and MRI
   (d) Biological effects of MRI