Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: VII (BM&I) Engineering

CBCS Regular Examination Nov – Dec 2015

2BM701 Advanced Medical Imaging Techniques

Time: 3 Hours / As per Scheme **Total Marks: 70**

Instruction:

(1) This Question paper has two sections. Attempt each section in separate answer book.

(2) Figures on right indicate marks.

(3) Be precise and to the point in answering the descriptive questions.

(4) Assume suitable data if necessary.

Section - I

Que.-1 **12**

A Give the advantage of CT over conventional X-ray. Explain CT principle with diagram. **6**

B List the various image reconstruction techniques. Explain any one reconstruction technique giving example. **6**

OR

Que.-1 **12**

A Discuss various generation of CT scanner giving neat diagram. **6**

B What do you mean by spiral CT? Explain the complete scanner design for spiral CT. **6**

Que.-2 **11**

A List the detectors used in radionuclide imaging system and explain any two giving neat diagram. **6**

B Draw the schematic diagram of rectilinear scanner and explain. **5**

OR

Que.-2 **11**

A Discuss various radioactive Decay modes. **6**

B Draw & explain the working principle of PET. **5**

Que.-3 **12**

A How much tissue will be imaged if collimation is set to 8 millimeters, scan time is 25 seconds, and pitch is 1.5:1? **3**

B What are the advantages of CT examinations over MRI examinations? **3**

C What are the biological effects of radionuclide? **3**

D Discuss principle & application of SPECT. **3**

Section – II

Que.-4

A Explain with neat diagram how Image is formed in Photograph, Xray and MRI. Why Hydrogen atoms are chosen for MRI? 4

B Mention Any 6 artifacts of MRI along with their possible causes. 3

C Define Following Terms: 3
1. Nutation(with figure)
2. Gradient
3. K Space

D What should be the frequency of RF pulse (w2)? Justify your answer. 2

OR

Que.-4 12

A 7

Tissue	T1(ms)	T2(ms)
H_2O	2500	2500
FAT	200	100
CSF	2000	300
Gray matter	500	100

Calculate the Signal Intensity ratios for H2O/Fat and CSF/Gray matter for the following condition.
1. TR=500ms,TE=25ms
2. TR=2500ms ,TE=100ms.

Demonstrate the above graphycally.

B Explain with neat diagram Spin Echo Pulse Sequences. 5

Que.-5 11

A Draw and explain the technique to select the multiple slices. 3

B Calculate the Range of Larmor Frequency for MRI if External Magnetic field ranges from 0.064T to 2T. 2

C Explain the photon detectors used in Thermal Imaging. 3

D Explain T1 Relaxation time with neat diagram. 3

OR

Que.-5

A Describe the types of magnet in terms of their Field strength and their Design. Which type of magnet is more suitable for MRI? 5

B Derive the equation of Null point in terms of T1. 1

C Mention the Applications of Thermal Imaging.

Que.-6

A Explain with neat diagram Inversion Recovery Pulse Sequences.

B Explain Slice Select Gradient with neat diagram

C Mention the properties of K Space.

----------END OF PAPER----------