Student Exam No._____

GANPAT UNIVERSITY

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

Regular Examination NOV– DEC 2016

2BM701 – Advanced medical Imaging Techniques

Time: 3 Hours **Total Marks: 70**

Instruction:
1. All Questions are compulsory
2. Answer to question of each section must be written in separate answer book
3. Figures to right indicate marks
4. Assume suitable data if necessary

Section - I

Que. – 1 [12]

(a) Solve the following problem using principle of iterative reconstruction method: 5

5	7
2	4

(b) What are the disadvantages of conventional tomography over computed tomography? 5

(c) Define "Beam Hardening". 2

OR

Que. – 1 [12]

(a) Which generation of CT scan has no moving parts? Draw the schematic arrangement of it and explain in detail. 6

(b) Enlist the different artifacts in CT image and mention the causes for it. 4

(c) What is attenuation? Write down the equation of attenuation coefficient. 2

Que. – 2 [11]

(a) Enlist the different components used in gamma camera. Draw the functional block diagram of it and explain in detail. 5

(b) What is the unit of CT number? Write down the equation to determine it. 2

(c) What are the characteristics of alpha, beta and gamma radiations? 4

OR

Que. – 2 [11]

(a) Enlist different types of collimator used in gamma camera. Draw the schematic arrangement of each. 5

(b) What is the principle of PET scanner? Explain. 6

Que. – 3 [12]

(a) Answer in Short: 5

i) Determine the sinogram for following:

14	39
35	12

ii) Find the value of pitch: If the body is moving 15 mm during one rotation and beam width is 5 mm.

iii) What is the value of CT number for water?

iv) What is the energy range of beta emissions?

v) What is the meaning of SPECT?

(b) Explain how nuclear medicine is different from normal x-ray and CT examinations? 3

(c) What is the purpose of windowing in CT scan? 2

(d) What is the difference between pixel and voxel? 2

Section – II

Que. – 4 [12]

(a) Explain frequency encoding and phase encoding with neat diagram. 6

(b) Explain Dephasing with example. 6

OR

Que. – 4 [12]

(a) Define following terms: 5

1. Gradient
2. Precession
3. Pulse repetition time
4. Active time
5. Responsivity

(b) Explain spin echo pulse sequence with neat diagram. 5

(c) What is Auto RF? Write down the equation of Magnetization under the partial flip condition. 2

Que. – 5 [11]

(a) Calculate the Range of Larmor Frequency for MRI if External Magnetic field ranges from 0.064T to 2T. 3

(b) What is Thermal imaging? Explain the photon Detectors used in thermal imaging. 5

(c) What is Null point calculate TI at null point. 3

OR

Que. – 5 [11]

(a) Calculate the maximum possible slices for TR=1000ms,TE=30ms,Ts=10ms and To=15ms 3

(b) State the Stefan Boltzmann law. Mention the applications of Thermal imaging 4

(c) Explain the properties of K Space. 4

Que. – 6 [12]

(a) Explain Inversion recovery pulse sequence with neat diagram. 6

(b) Explain slice select gradient. How can we change the thickness of the slice? 6

END OF PAPER