Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3170303 Date:03-01-2023

Subject Name:Medical Imaging Techniques

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is digital subtraction angiography?	**03**
	(b)	List out a limitation of conventional radiology. How it is overcome in computed tomography?	**04**
	(c)	Distinguish between the stationary anode X-ray tube and the rotating anode X-ray tube. Explain with the help of a diagram.	**07**
Q.2	**(a)**	What is Hounsfield Unit (H)? Indicate the CT number for water and air.	**03**
	(b)	Why are collimators and grids essential parts/devices in an X-ray radiographic unit?	**04**
	(c)	Define Computer tomography. Describe the various scanning techniques used in computed tomography.	**07**
		OR	
	(c)	Explain the working of an X-ray image intensifier system with the help of a block diagram.	**07**
Q.3	**(a)**	Mention the working principle of the nuclear magnetic imaging system.	**03**
	(b)	Distinguish between T1 and T2 relaxation times.	**04**
	(c)	Write a short note on Motion Mode in Ultrasound Imaging.	**07**
		OR	
Q.3	**(a)**	What are the advantages of an NMR imaging system over another imaging system?	**03**
	(b)	List out the biological effect of the MR imaging system.	**04**
	(c)	Explain the construction of an ultrasound probe used for pulse-echo systems.	**07**
Q.4	**(a)**	List out the advantages of an ultrasound imaging system.	**03**
	(b)	Define 1. Reflection 2. Refraction 3. Attenuation 4. Absorption	**04**
	(c)	How is an ultrasound generated? Explain the role of frequency, focusing, and active element diameter with reference to ultrasound transducers.	**07**
		OR	
Q.4	**(a)**	Define: Piezoelectric Effect	**03**
	(b)	What are the transducer beam characteristics?	**04**
	(c)	Draw and explain the working of the Gamma Camera.	**07**
Q.5	**(a)**	What are the advantages of digital radiology?	**03**
	(b)	Discuss Axial and Lateral Resolution in Ultrasound Imaging.	**04**
	(c)	Explain the working of Position Emission Tomography (PET) with the help of a block diagram.	**07**
		OR	
Q.5	**(a)**	Define ‘Resolution’ with respect to ultrasound systems. What are the two types of resolution in an ultrasound system?	**03**

(b) List out the biological effect of Radionuclide Imaging. **04**

(c) Explain the working of single-photon emission computed tomography (SPECT) with the help of a block diagram. **07**

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