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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: MEDICAL ELECTRONICS ENGINEERING **Duration: 3 hrs.**
Course Code: 19ML5PCPMI **Max Marks: 100**
Course: Physics of Medical Imaging **Date: 01.03.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	What is the use of beam restrictors and radiographic grids in X-Ray imaging? Deliberate on various types of beam restrictors and grids with respect to their physical characteristics and positioning.	**07**
	b)	Discuss the construction of intensifying screen used in X-ray imaging. Which parameters governs the speed of an intensifying screen?	**07**
	c)	What is a CT number? Give its significance in CT imaging.	**06**

OR

2	a)	Which measurable indices are used to decide optimum objective quality of an X-ray image? Discuss them.	**07**
	b)	With a neat block diagram, discuss the functions of the major components of Digital Subtraction Angiography system. What are the advantages and limitations of a DSA over film subtraction angiography?	**07**
	c)	Discuss the factors that affect the intensity of the X-ray beam.	**06**

UNIT - II

3	a)	Describe single element transducer typically used in ultrasound imaging	**07**
	b)	What are the disadvantages of manual B- scan system? How can it be overcome? Discuss.	**06**
	c)	Define the figure of merit for the thermographic imaging system. How is it related to sensitivity of thermography equipment?	**07**

UNIT - III

4	a)	Mention the different tests that could be performed using radiation detector probe in radionuclide imaging. Explain any two tests in detail.	**10**
	b)	With a neat diagram explain the basic principle of operation of Single Photon Emission CT. What is the major difference in X-ray CT and SPECT?	**10**

OR

5	a)	With a neat diagram explain the basic principle of operation of Positron Emission Tomography. What is the major disadvantage of PET imaging?	**10**
	b)	Which imaging device is used for Scintigraphy? Discuss electronic processing unit the same. How intrinsic resolution of this imaging device can be measured?	**10**

UNIT - IV

6	a)	Discuss the significance of Free induction decay and Magnetic dipole movement in MRI imaging.	**06**
	b)	How is a spin echo generated? Discuss the process of spin echo imaging in MRI.	**06**
	c)	Tissue relaxation properties contribute to image contrast in MRI. Justify your answer. Discuss how they contribute in improving dynamic range of MRI.	**08**

UNIT - V

7	a)	Which are the commonly used cooling regimes to maintain magnet windings at temperatures sufficient to maintain superconductivity in MRI? Discuss in brief.	**07**
	b)	Describe the biological effects of magnetic fields in MRI	**07**
	c)	How is image contrast produced by BOLD fMRI?	**06**

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