Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2023

BIOMEDICAL ENGINEERING
VI Semester
BM5602 & Radiological Equipment

(Regulation 2019)

Time: 3hrs Max.Marks: 100

CO 1	Discuss the principle and working of various radiography equipment.
CO 2	Explain the tomography concept and image reconstruction techniques.
CO 3	Describe the basic principle and working of Magnetic resonance imaging technique.
CO 4	Explain the concept of nuclear imaging techniques and radiation detectors.
CO 5	Demonstrate the effects of radiation, radiation safety and the principle of Radio therapy techniques.

BL – Bloom's Taxonomy Levels
(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

PART- A (10 x 2 = 20 Marks)
(Answer all Questions)

Q. No	Questions	Marks	CO	BL
1	Distinguish between Hard and Soft X-rays.	**2**	1	L2
2	How does a latent image is formed in PSPs?	**2**	1	L2
3	A multi-detector CT scanner has a detector array with 128 detectors, and each detector measures 0.5 mm in width. Calculate the total coverage of the detector array in millimeters	**2**	2	L3
4	Estimate the attenuation coefficient of unknown tissue when the CT number is 70HU.($\mu_{water} = 0.18$)	**2**	2	L3
5	Determine the Larmor frequency of hydrogen nuclei placed in a 3T MRI scanner.	**2**	3	L3
6	Explain k-Space.	**2**	3	L2
7	The half-life of a radiopharmaceutical is 6 hours. If a patient is injected with 10 mCi of the radiopharmaceutical, how much activity will remain after 24 hours?	**2**	4	L3
8	Explain the significance of pulse height Analyzer in Anger camera.	**2**	4	L2
9	Explain linear accelerator.	**2**	5	L2
10	Write notes on IMRT.	**2**	5	L2

PART- B (5 x 13 = 65 Marks)

Q. No	Questions	Marks	CO	BL
11 (a)	Explain in detail the various detector technologies of Digital Radiography.	**13**	1	L2
	OR			
11 (b)	With neat sketches explain the principle of production of X-rays in X-ray tube	**13**	1	L2
12 (a)	Compare and contrast the key features of first to the latest-generation CT scanners. How have the advancements in technology has led to improved image quality and reduced radiation dose?	**13**	2	L4

	OR			
12 (b)	Compare and contrast the filtered back projection (FBP) and iterative reconstruction CT reconstruction algorithms. How do these algorithms differ in terms of image quality, computational demands, and potential artifacts?	**13**	2	L4
13 (a)	Compare and contrast the characteristics of T1 and T2 weighted images in MRI. How do these differences impact the visualization of different tissues?	13	3	L4
	OR			
13 (b)	Compare and contrast the roles of gradient magnetic coils, RF coils, and shim coils in MRI. How do these components contribute to image quality and diagnostic accuracy?	**13**	3	L4
14 (a)	With neat sketches, give a detailed description of the construction and working of Gamma Camera.	**13**	4	L2
	OR			
14 (b)	Explain the principle of SPECT and PET in detail.	**13**	4	L2
15 (a)	Describe the construction and working principle of any three types of dosimeters in detail.	**13**	5	L2
	OR			
15 (b)	Write short notes on (i) ICRP	**6**	5	L2
	(ii) AERB	**7**	5	L2

PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

Q. No	Questions	Marks	CO	BL
16.	Analyze the various key technological advancements in DSA that has led to the enhanced visualization of vascular structures?	**15**	1	L4

ADDITIONAL CONTROLLER OF EXAMINATION
AU
CHENNAI
600 025