Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Second Semester

Biomedical Engineering

BM3252 / UPHT24206 - MEDICAL PHYSICS

Regulations – 2021 & 2024

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Name the two properties of light.	L1	1	2
2.	Why is thermography considered non-invasive?	L2	1	2
3.	Define spontaneous emission.	L1	2	2
4.	How does a technetium generator work?	L2	2	2
5.	Define Bremsstrahlung radiation.	L1	3	2
6.	Compare Photoelectric and Compton interactions.	L2	3	2
7.	State the inverse square law in radiation physics.	L1	4	2
8.	What is LD_{50})? How is it relevant in radiation biology?	L2	4	2
9.	List different modes of ultrasound scanning.	L1	5	2
10.	Differentiate between reflection and transmission in ultrasound.	L2	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Calculate the intensity of light at a certain distance from a source using the inverse square law.	L4	1	8
		ii	Compare the behavior of light in a vacuum and in a dense medium.	L4	1	8
			Or			
	b	i	Apply the concept of non-ionizing radiation to evaluate its effects on human health.	L3	1	8
		ii	Design a simple shield to minimize exposure to microwave radiation.	L3	1	8
12.	a	i	Analyze the differences in radiation shielding required for alpha, beta, and gamma radiation.	L4	2	8
		ii	Compare the energy levels of alpha, beta, and gamma emissions.	L4	2	8
			Or			
	b	i	Design an optimized technetium generator with improved efficiency for medical use.	L4	2	8
		ii	Evaluate the performance of different radionuclide generators in terms of cost, efficiency, and safety.	L4	2	8

13.	a	i	Calculate the energy loss of a beta particle using linear energy transfer and specific ionization data.	L3	3	8
		ii	Estimate neutron dose and relate it to biological damage in tissue.	L3	3	8
			Or			
	b	i	Explain the three main interaction processes of X-ray/gamma photons with matter.	L4	3	8
		ii	Compare neutron therapy and photon therapy in terms of biological effect and precision.	L4	3	8
14.	a	i	Apply the inverse square law to calculate radiation intensity at a given distance.	L3	4	8
		ii	Describe how different levels of acute radiation syndrome manifest in patients after exposure to increasing doses.	L3	4	8
			Or			
	b	i	Compare the health risks between stochastic and non-stochastic radiation effects.	L4	4	8
		ii	Explain the concept of LD_{50}.	L4	4	8
15.	a	i	Illustrate the working principle of an ultrasound transducer using a labeled diagram.	L3	5	8
		ii	Evaluate the impact of cavitation in ultrasound therapy and diagnostics.	L3	5	8
			. Or			
	b	i	Apply the Doppler principle to estimate the velocity of blood.	L4	5	8
		ii	Compare the clinical significance of Doppler ultrasound in cardiology and obstetrics.	L4	5	8

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