Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 120017

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Fifth Semester
Biomedical Engineering
U23BMV18 - MEDICAL PHYSICS
(Regulation 2023)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define systemic effect.	2	K2	CO1
2.	List the three fundamental spectral parameters used to characterize the color properties of light.	2	K2	CO1
3.	Identify what categorizes an isometric state.	2	K2	CO2
4.	Mention one physical process that results in neutrino emission.	2	K2	CO2
5.	State the inverse square law and mention its significance in physical phenomena.	2	K2	CO3
6.	Indicate the reason, why neutrons are preferred for interaction with matter?	2	K2	CO3
7.	Outline how different levels of radiation dosage affect the human body.	2	K2	CO4
8.	Differentiate different phases of acute radiation syndrome.	2	K2	CO4
9.	Define the terms in the relation $f_d = 2f_0 \frac{v_b}{c}$.	2	K1	CO5
10.	Indicate how Magnetostriction oscillator is tuned to produce ultrasound waves.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	A biological tissue sample has a relative permittivity (ε_r) of 80, conductivity (σ) of 0.5 S/m, and is subjected to an alternating electric field at a frequency of 1 MHz. Calculate the loss tangent ($\tan \delta$) of the tissue and determine whether it behaves more like a dielectric or a conductor at this frequency.	13	K2	CO1
		(OR)			
	b)	Analyze the physiological changes in the eye during adaptation to darkness and what compromises in performance result?	13	K2	CO1
12.	a)	Explain the production of man-made radio isotopes, their application in medical diagnoses and their advantages. Discuss any two such isotopes produced by cyclotron.	13	K2	CO2
		(OR)			
	b)	Explain in detail the mechanisms of absorption, scattering, and attenuation of gamma rays in matter. Discuss their physical principles, influencing factors, and implications for radiation shielding and medical imaging.	13	K2	CO2
13.	a)	Vividly discuss the mechanism by which gamma radiation loses energy when it interacts with tissue. Comment about the relative importance of the mechanism varying with the energy of gamma radiation.	13	K2	CO3
		(OR)			
	b)	Explain in detail the processes Photo-electric absorption, Compton effect and pair production with appropriate diagrams wherever necessary.	13	K2	CO3
14.	a)	Enlist the units of measuring radiation dosage. Describe the key points and limitations of LD 50 .	13	K2	CO4
		(OR)			
	b)	Distinguish between stochastic and non-stochastic effects. Compare their cause, severity, probability, threshold and time of onset etc., Give suitable examples.	13	K2	CO4
15.	a)	Summarize the interaction of ultrasound with matter in terms of reflection, scattering, absorption and attenuation. Provide ample pictorial illustrations wherever necessary.	13	K3	CO5
		(OR)			
	b)	List out the properties of ultrasound. Explain a normal scanning procedure using ultrasound and brief about Doppler and Duplex scanning methods.	13	K3	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Identify the advantages and limitations of recommending X-ray and Gamma ray for diagnosis in patients. Mention for each the precautions to be taken for patients during the diagnosis.	15	K3	CO4
		(OR)			
	b)	Interpret the functioning of Geiger-Muller Counter with a neat diagram. What is its efficiency? Comment how a GM counter can be used in assessing radon levels.	15	K3	CO4