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: 120016

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Third Semester
Biomedical Engineering
U23BM303 – BIOSCIENCES FOR MEDICAL ENGINEERING
(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.	List any two physiological buffers in living system.	2	K1	CO1
2.	Define weak acid and weak base.	2	K1	CO1
3.	List any two clinical applications of radioisotopes.	2	K2	CO2
4.	Compare nucleosides and nucleotides in nucleic acid.	2	K2	CO2
5.	Compare various features of necrosis and apoptosis.	2	K2	CO3
6.	State any four bleeding disorders.	2	K2	CO3
7.	Define edema and mention one primary cause.	2	K1	CO4
8.	Differentiate between hyperemia and ischemia.	2	K2	CO4
9.	Compare virus and bacterium.	2	K2	CO5
10.	Mention two common viral and bacterial diseases in human.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the properties of water that make it an essential biological solvent and discuss their applications in living systems.	13	K2	CO1
		(OR)			
	b)	Describe the structure and functions of major biomolecules (carbohydrates, proteins, lipids, and nucleic acids) and explain their importance in biological systems.	13	K2	CO1
12.	a)	Discuss the classification, structure, and properties of carbohydrates, including monosaccharides, disaccharides, oligosaccharides and polysaccharides.	13	K2	CO2
		(OR)			
	b)	Explain the classification, structure, and properties of lipids, including simple, compound, and derived lipids. Discuss the nomenclature and structural features of fatty acids and their biological significance.	13	K3	CO2
13.	a)	Discuss the process of inflammation and repair, including the stages of acute and chronic inflammation, tissue regeneration, and fracture healing.	13	K2	CO3
		(OR)			
	b)	Describe the cellular adaptations to stress, including hypertrophy, hyperplasia, atrophy, and metaplasia, and explain their physiological and pathological relevance.	13	K2	CO3
14.	a)	Discuss the pathophysiology, clinical features, and complications of disseminated intravascular coagulation.	13	K2	CO4
		(OR)			
	b)	Describe the types, causes, and pathological consequences of thrombosis.	13	K2	CO4
15.	a)	Describe the morphological features and structural organization of bacteria and viruses.	13	K3	CO5
		(OR)			
	b)	Explain natural and artificial immunity, the types of hypersensitivity, and the role of antibodies and cell-mediated mechanisms in tissue injury.	13	K3	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	A 35-year-old patient presents with fatigue, unexplained weight loss, and frequent infections. The physician suspects a hormonal imbalance and possible autoimmune disorder. Blood samples are collected to measure insulin levels and detect specific autoantibodies. Explain how RIA (Radioimmunoassay) can be used to measure insulin levels and how ELISA (Enzyme-Linked Immunosorbent Assay) can be used to detect autoantibodies in the patient's serum. Discuss the principles, steps involved, and the clinical significance of the results.	15	K4	CO5
		(OR)			
	b)	A 60-year-old male presents with a slowly enlarging, painless mass in the neck. Fine-needle aspiration cytology suggests abnormal cell proliferation, and a biopsy is recommended for further evaluation. Explain the possible types of tumour this patient could have, differentiating between benign and malignant tumours. Discuss the mechanisms of carcinogenesis, modes of tumour spread, and the clinical significance of biopsy in diagnosis and management.	15	K2	CO3