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: 120005

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Fifth Semester
Biomedical Engineering
U19BM510 – BIOMEDICAL INSTRUMENTATION
(Regulation 2019)

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 half-cell potential.	2	K1	CO1
2.	Mention the applications of biopotential electrodes.	2	K1	CO1
3.	Specify the characteristics of biosignal.	2	K2	CO2
4.	State the principle of ECG limb leads.	2	K2	CO2
5.	List the advantages of single ended bio-amplifier.	2	K2	CO3
6.	Mention the limitations of differential amplifier.	2	K1	CO3
7.	Compare blood flow and cardiac output.	2	K2	CO4
8.	List out the methods of measuring respiratory rate.	2	K1	CO4
9.	Classify blood glucose sensors.	2	K1	CO5
10.	Compare absorbance and transmittance.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the origin of biopotentials and how they propagate in biological tissues?	13	K2	CO1

		(OR)			
	b)	Discuss the recording problems encountered during biopotential measurements. Explain the role of motion artifacts and methods to minimize them.	13	K2	CO1
12.	a)	Describe the 10-20 international system of electrode placement for EEG. Why is standardized placement important?	13	K2	CO2
		(OR)			
	b)	Explain the standard 12-lead ECG system. Include electrode placement and explain how the leads are derived.	13	K2	CO2
13.	a)	Describe the importance of bio-amplifiers in biomedical instrumentation. Discuss the requirements and key features of a bio-amplifier.	13	K2	CO3
		(OR)			
	b)	Discuss the need for isolation in bio-signal amplifiers. Explain the working of transformer and optical isolation techniques.	13	K2	CO3
14.	a)	Describe the working of an ultrasound blood flow meter. How does it differ from electromagnetic methods?	13	K2	CO4
		(OR)			
	b)	Explain the various methods for body temperature measurement. Discuss types of temperature sensors and their clinical applications.	13	K2	CO4
15.	a)	Explain the principle and working of biochemical sensors. Describe the measurement of pH, partial pressure of oxygen (pO_2), and carbon dioxide (pCO_2).	13	K2	CO5
		(OR)			
	b)	What is an Auto-Analyzer? Describe a simplified schematic and explain its role in clinical chemistry.	13	K2	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Justify the integration of a Right Leg Driven circuit with band-pass filtering in a modern ECG front-end amplifier. How does this combination enhance signal quality, and what challenges might arise in its implementation?	15	K4	CO3
		(OR)			
	b)	Compare and analyze the use of a spectrophotometer and a sodium-potassium analyzer in clinical diagnostics. In what scenarios is each preferred?	15	K3	CO5