Reg. No: 24BIT0014

B/L/TY

Final Assessment Test – November 2025

VIT Vellore Institute of Technology

Course: **BHST204L - Medical Electronics**

Class NBR(s): **0964**

Slot: **F2+TF2**

Time: **Three Hours**

Max. Marks: **100**

- **KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE**
- **DON'T WRITE ANYTHING ON THE QUESTION PAPER**

COs	CO Statements
CO1	Explain the principles and applications of biomedical instrumentation systems.
CO2	Identify and describe different biomedical sensors and transducers used in medical applications.
CO3	Analyze and process bio-signals using amplification, filtering, and noise reduction techniques.
CO4	Demonstrate knowledge of diagnostic instrumentation, including ECG, EEG, and blood pressure monitoring.
CO5	Explain the functioning and applications of therapeutic and assistive devices in healthcare.
CO6	Compare various medical imaging modalities and their applications in diagnostics.
CO7	Assess safety concerns, regulatory requirements, and ethical aspects related to medical electronics.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

(10 X 10 = 100 Marks)

1.	A 55-year-old cardiac patient undergoes continuous ECG monitoring in an ICU. Analyze how the dynamic characteristics of the ECG monitoring equipment can affect diagnostic accuracy.	CO1	BL4
2.	Identify common sources of error in biomedical measurements such as motion artifacts and signal drift. Propose engineering solutions to minimize these issues.	CO1	BL4
3.	Design a signal conditioning system for a flow sensor used in a ventilator. Include filtering, amplification, and isolation techniques.	CO2	BL3
4.	Discuss the working principles of pressure, temperature, and flow sensors. Provide at least two comparative examples in a clinical context.	CO2	BL4
5.	Explain the various noise and artifact reduction techniques used in bio-signal processing. How do methods like adaptive filtering and wavelet transforms contribute to signal enhancement in ECG and EEG signals?	CO3	BL5
6.	Explain the principles and applications of Electroencephalography (EEG). What are the major challenges in EEG signal processing, and how do techniques like artifact rejection and frequency analysis help in accurate brain activity monitoring?	CO4	BL4

7.(a)	Explain the working principle and applications of defibrillators. How do automatic and manual defibrillators differ, and what are the challenges in designing these devices for use in emergency situations?	CO5	BL3
	OR		
7.(b)	Discuss the impact of assistive technologies like cochlear implants and hearing aids on individuals with hearing impairments. How do these devices function, and what advancements have been made in terms of patient outcomes?	CO5	BL3
8.	Describe the working principle of Ultrasound imaging and Doppler techniques. How do these methods contribute to non-invasive diagnostic imaging, particularly in cardiovascular and obstetric care?	CO6	BL3
9.	Discuss the principles and applications of Magnetic Resonance Imaging (MRI). How does MRI differ from other imaging techniques, and what advantages does it offer in terms of soft tissue imaging?	CO6	BL4
10.(a)	Examine the ethical considerations in medical device development and deployment. What are the key ethical issues regarding patient privacy, device safety, and accessibility in the context of advancing medical technologies?	CO7	BL5
	OR		
10.(b)	Discuss the importance of electrical safety in medical electronics. What are the potential physiological effects of electrical current on patients, and how are safety standards (e.g., IEC 60601) designed to mitigate these risks?	CO7	BL5

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