Reg. No.															

Question Paper Code	13506

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Electronics and Communication Engineering

20ECEL610 - MEDICAL ELECTRONICS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Electromagnetic coupling cannot be reduced by _____ (a) shielding (b) wire twisting (c) multiple grounding (d) common grounding	1	K1	CO1
2.	None law responds to a (a) Memory (b) Attention (c) Stimulus (d) Reasoning	1	K1	CO1
3.	Which part of the ECG represents ventricular depolarization? (a) P wave (b) T wave (c) QRS complex (d) PR interval	1	K1	CO2
4.	PCG is most useful in diagnosing _____ (a) Epileptic seizures (b) Arrhythmias (c) Heart murmurs (d) Brain tumors	1	K1	CO2
5.	Which principle is commonly used in electromagnetic blood flow meters? (a) Doppler Effect (b) Faraday's Law of Induction (c) Ohm's Law (d) Pascal's Principle	1	K1	CO3
6.	Which of the following devices is used to measure blood pressure? (a) Sphygmomanometer (b) Electrocardiograph (c) Thermometer (d) Pulse oximeter	1	K1	CO3
7.	A DC defibrillator is primarily used to_____ (a) Decrease blood glucose levels (b) Restart the heart during cardiac arrest (c) Enhance kidney function (d) Improve lung ventilation	1	K1	CO4
8.	Which type of waves do MRI scanners use to generate detailed images? (a) Soundwaves (b) X – rays (c) Magnetic fields and radio waves (d) Gamma rays	1	K1	CO4
9.	Shortwave diathermy is primarily used for _____ (a) Bone cutting (b) Laser surgery (c) Diagnosing fractures (d) Deep tissue heating in physiotherapy	1	K1	CO5
10.	A "radio pill" is mainly used for _____ (a) Delivering medication to the liver (b) Capturing images of the gastrointestinal tract (c) Reducing radiation exposure in cancer patients (d) Measuring ECG remotely	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	Why Ag/ Ag Cl electrode is most widely used in bio potential recording?	2	K2	CO1
12.	Mention two important characteristics of a bio-signal amplifier.	2	K1	CO1
13.	List two common frequency bands observed in an EEG signal.	2	K1	CO2
14.	Define latency in EMG.	2	K1	CO2
15.	What is pH electrode? Give its significance?	2	K1	CO3
16.	Define stroke volume, heart rate, cardiac output.	2	K1	CO3
17.	Mention the requirements of pacemaker pulse generation.	2	K1	CO4
18.	What is the purpose of Oxygenators in Heart Lung Machine?	2	K1	CO4
19.	Distinguish cutting and Coagulation in Electrosurgical diathermy.	2	K2	CO5
20.	What are the common methods used for modulation of biotelemetry systems?	2	K2	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

21.		Mention one advantage of using an insulin pump over traditional insulin injections.	*2*	*K1*	*CO6*
22.		What is meant by lab-on-a-chip technology?	*2*	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Describe the typical waveforms and characteristics (amplitude, frequency, duration) of ECG, EEG, EMG, and PCG signals. Explain their use in clinical diagnosis.	*11*	*K2*	*CO1*
		OR			
	b)	Explain about the different types of Electrodes used for measuring the Bio Potential.	*11*	*K2*	*CO1*
24.	a)	A patient arrives at the emergency department with chest pain and dizziness. The doctor orders an Electrocardiogram (ECG) to assess the patient's heart condition. As a biomedical engineer identify proper ECG lead systems and recording methods for accurate diagnosis. Summarize the typical waveforms and signal characteristics observed in ECG recordings and discuss how they help in identifying potential cardiac abnormalities such as arrhythmias or myocardial infarction.	*11*	*K3*	*CO2*
		OR			
	b)	A physiotherapist is assessing a patient with suspected neuromuscular dysfunction using Electromyography (EMG). As a biomedical engineer, Identify which EMG lead systems and recording methods is chosen for this diagnosis. Interpret the typical waveforms and the signal characteristics observed in EMG recordings and discuss how they help in identifying muscle disorders such as neuropathy or myopathy.	*11*	*K3*	*CO2*
25.	a)	Explain the operation of blood cell counter based on the principle of microscopic and optical method.	*11*	*K2*	*CO3*
		OR			
	b)	Explain the dye dilution method for measurement of cardiac output.	*11*	*K2*	*CO3*
26.	a)	What is a Defibrillator? Explain in detail the principle of operation of DC Defibrillator.	*11*	*K2*	*CO4*
		OR			
	b)	Discuss the principle of operation of a Heart Lung machine with neat diagram	*11*	*K2*	*CO4*
27.	a)	Draw the block diagram and explain the working of the Ultrasound Diathermy unit.	*11*	*K2*	*CO5*
		OR			
	b)	Explain the basic Principle, working and design considerations of the Bio-Telemetry system with a neat block Diagram.	*11*	*K2*	*CO5*
28.	a)	Define telemedicine. Explain its components, modes of delivery, and various applications in healthcare.	*11*	*K2*	*CO6*
		OR			
	b)	What is a Brain-Machine Interface (BMI)? Explain its working with a neat block diagram.	*11*	*K2*	*CO6*