Reg. No.																

Question Paper Code	14444

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Sixth Semester

Electronics and Instrumentation Engineering

(Common to Instrumentation and Control Engineering)

20ICPC602 - BIOMEDICAL INSTRUMENTATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	*K – Level*	*CO*
1.	The basic functional unit of the nervous system is a) Nephron b) Neuron c) Alveoli d) Osteocyte	*1*	*K1*	*CO1*
2.	Action potential in a neuron is produced due to a) Constant ion concentration b) Decrease in blood flow c) Sudden change in membrane permeability d) Bone movement	*1*	*K2*	*CO1*
3.	If the resting potential of a neuron is disturbed, the immediate effect will be on a) Bone density b) Nerve impulse transmission c) Kidney filtration d) Blood viscosity	*1*	*K3*	*CO1*
4.	The instrument used to measure pulmonary function is a) ECG b) Spirometer c) EEG d) ERG	*1*	*K1*	*CO2*
5.	Photoplethysmography is mainly used to measure a) Bone density b) Muscle strength c) Blood volume changes d) Brain activity	*1*	*K2*	*CO2*
6.	For measuring lung capacity in a pulmonary lab, the suitable instrument is a) ECG machine b) Spirometer c) Defibrillator d) EEG recorder	*1*	*K3*	*CO2*
7.	ECG is used to record a) Brain activity b) Muscle activity c) Heart activity d) Eye movement	*1*	*K1*	*CO3*
8.	Floating electrodes are preferred because they a) Reduce motion artifact b) Increase shock hazard c) Produce X-rays d) Measure blood pressure	*1*	*K2*	*CO3*
9.	To monitor a patient's cardiac rhythm continuously, the suitable instrument is a) EEG b) EMG c) ECG d) ERG	*1*	*K3*	*CO3*
10.	MRI mainly uses a) X-rays b) Magnetic fields and radio waves c) Ultrasound waves d) Infrared rays	*1*	*K1*	*CO4*

11.	Thermography helps in detecting a) Temperature variations in tissues b) Bone density only c) Blood sugar levels d) Electrical resistance	*1*	*K2*	*CO4*
12.	For imaging soft tissues of the brain without ionizing radiation, the preferred technique is a) X-ray b) Fluoroscopy c) Thermography d) MRI	*1*	*K3*	*CO4*
13.	A pacemaker is used to a) Improve hearing b) Regulate heart rhythm c) Measure blood pressure d) Monitor respiration	*1*	*K1*	*CO5*
14.	Drug delivery devices are designed to a) Measure temperature b) Record ECG signals c) Produce X-rays d) Administer medication accurately	*1*	*K2*	*CO5*
15.	In ICU patient monitoring systems, multiple physiological parameters are monitored to a) Decorate the ICU b) Increase room temperature c) Assess patient condition continuously d) Replace doctors completely	*1*	*K3*	*CO5*
16.	A patient with severe cardiac arrhythmia may require a a) Spirometer b) Pacemaker c) Endoscope d) Oximeter	*1*	*K3*	*CO5*

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	Solve for the outcome of a stimulus using the "All-or-Nothing" principle as it applies to neural conduction mechanisms.	*3*	*K3*	*CO1*
18.	Survey the selection criteria for transducers.	*3*	*K4*	*CO1*
19.	Distinguish between ESR and GSR measurements.	*3*	*K4*	*CO2*
20.	Identify the need for blood gas analysis.	*3*	*K3*	*CO2*
21.	Compare EMG and ERG.	*3*	*K4*	*CO3*
22.	Identify any two applications of ultrasonography.	*3*	*K3*	*CO4*
23.	A patient with a metallic implant is scheduled for an MRI. Based on the principle of MRI, analyze how the strong magnetic field and radiofrequency pulses interact with this implant, and explain why this scenario is contraindicated.	*3*	*K3*	*CO4*
24.	Compare and contrast bubble oxygenator and membrane oxygenator based on working and performance.	*3*	*K3*	*CO5*

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Analyze the structure of a cell and describe the mechanism of resting and action potential in detail.	*12*	*K4*	*CO1*
		OR			
	b)	Examine the function of cardiovascular and with neat diagrams.	*12*	*K4*	*CO1*
26.	a)	Choose any two methods for Blood pressure measurements and explain with neat diagram.	*12*	*K3*	*CO2*
		OR			
	b)	Utilize the principle, construction and applications of blood gas analyzers for measurement of blood gas with neat diagram.	*12*	*K3*	*CO2*

27.	a)	Analyze the lead systems, recording methods and typical waveforms for ECG measurement.	*12*	*K4*	*CO3*
		OR			
	b)	Examine the electrical safety in medical environments, shock hazards and instruments for checking safety parameters.	*12*	*K4*	*CO3*
28.	a)	Model the working of an MRI system and explain how the physical process of proton alignment results in high-resolution images.	*12*	*K3*	*CO4*
		OR			
	b)	Organize the complete workflow of a biometric system, detailing the stages of data collection, feature extraction, template creation, and matching.	*12*	*K3*	*CO4*
29.	a)	Develop a schematic showing construction, working and types of defibrillators.	*12*	*K3*	*CO5*
		OR			
	b)	Build a conceptual framework for the structure and working mechanism of a dialyzer used in hemodialysis.	*12*	*K3*	*CO5*