GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2021
BIOMEDICAL INSTRUMENTATION
EI602A

TIME ALLOTTED: 3HR **FULL MARKS:70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No.
1.	(i)	Which one of the following has the thickest wall? a) Right ventricle b) Left ventricle c) Right atrium d) Left atrium	1	CO1
	(ii)	Mitral valve is present between a) right atrium and left ventricle b) right and left ventricle c) left ventricle and aorta d) left atrium and left ventricle	1	CO1
	(iii)	Which type of blood vessels carries blood away from the heart? a) Veins b) Arteries c) Capillaries d) Arteries, veins and capillaries	1	CO1
	(iv)	Interactions between neurons commonly occur across junctions called a) Synapses b) Juxtapositions c) presynaptic membranes d) postsynaptic membranes	1	CO1
	(v)	Neurons are specialized to receive, conduct and transmit a) electrochemical signals b) action potentials c) electrical signals d) chemical signals	1	CO1
	(vi)	Electrodes used for recording of EEG are a) Smaller than the electrodes used in ECG b) Larger than the electrodes used in ECG c) Same in size as the electrodes used in ECG d) None of these	1	CO2

(vii)	The resistance in the parallel path of the electrode-electrolyte interface circuit represents a) Leakage resistance b) Temperature compensating resistance c) Contact resistance d) Lead resistance	1	CO2
(viii)	Normal subjects while they are relaxed and awake with closed eyes, then the type of EEG appears a) Delta rhythm b) Theta rhythm c) Alpha rhythm d) Gamma rhythm	1	CO4
(ix)	In 10 − 20 system of EEG measurement, the number of electrodes placed in the midline are a) 8 b) 2 c) 3 d) 10	1	CO3
(x)	What is responsible for generating BP? a) contraction of atria b) contraction of ventricles c) relaxation of atria d) relaxation of ventricles	1	CO1
(xi)	The natural pacemaker is a) AV node b) Purkinje Fibre c) SA node d) Superior Venacava	1	CO4
(xii)	MRI has a high _____ resolution a) Spectral b) Temporal c) Frequency d) Magnitude	1	CO4

GROUP – B
(Short Answer Type Questions)

(Answer any *three* of the following) **3 x 5 = 15**

		Marks	**CO No.**
2.	Describe Doppler frequency shift type Ultrasonic blood flow meter with proper diagram.	5	CO2
3.	Explain the physics behind the Magnetic Resonance Imaging.	5	CO3
4.	Classify EMG signals according to their frequencies?.	5	CO1
5.	Explain the difficulties in transmission and reception of Biological signals over long distance.	5	CO4
6.	Draw a standard ECG signal and explain its characteristics in details.	5	CO3

GROUP – C
(Long Answer Type Questions)

(Answer any three of the following) 3 x 15 = 45

			Marks	CO No.
7.	(a)	What is radiation thermometry? What is its advantage over other imaging techniques? Explain the method of radiation thermometry.	5	CO4
	(b)	Explain abnormal heart sounds in a human body. Mention the reasons of their appearances and effects.	6	CO1
	(c)	Elaborate the propagation of electrical impulse through the heart muscles.	4	CO1
8.	(a)	Draw the electrical equivalent circuit of the system when two electrodes are placed on the body surface and explain each part of it.	6	CO2
	(b)	Draw the schematic of a biological neuron and explain its structure.	6	CO1
	(c)	What are the errors in measuring bioelectric potentials?	3	CO3
9.	(a)	Explain the method for receiving biopotential over a long distance.	4	CO4
	(b)	Mention the basic approaches for protection against shock and power.	6	CO3
	(c)	Explain various types of body surface electrodes with schematic diagram.	5	CO2
10.	(a)	What is non-invasive blood pressure measurement? Explain it schematic diagram.	6	CO3
	(b)	Mention the different valves present in a human heart, their position and functions.	6	CO1
	(c)	Draw and explain the pulmonary circulation system of human body.	3	CO1
11.		Write short notes on any three of the followings:		
	(a)	Muscles in the human body	5	CO1
	(b)	Normal heart sound	5	CO1
	(c)	External and Internal pacemaker	5	CO2
	(d)	Intravascular blood pressure measurement	5	CO2