

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- VI EXAMINATION – SUMMER 2020

Subject Code: 2161712

Date: 02/11/2020

Subject Name: BIO-POTENTIAL INSTRUMENTATION

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Draw & discuss the block diagram of generalized medical instrumentation system.	03
	(b) Explain systemic blood circulatory system in detail with neat diagram.	04
	(c) Discuss the Ideal characteristics of an op-amp. Draw the circuit diagram of Instrumentation amplifier and derive its gain equation.	07
Q.2	(a) “Human body as a control system”. Discuss this statement with necessary justification	03
	(b) Give the classification of different types of noise. Enlist the different strategies for noise reduction	04
	(c) Discuss electrode-electrolyte interface in detail.	07
	OR	
	(c) Explain in detail the generation of Resting membrane potential.	07
Q.3	(a) Discuss different types of protections against defibrillation shock in ECG machine.	03
	(b) Draw and explain preamplifier circuit of ECG machine.	04
	(c) Write a short note on following:	07
	i) ECG readout devices	
	ii) Common ECG machine Faults & its troubleshooting	
	OR	
Q.3	(a) Draw & discuss various limb leads associated with ECG machine.	03
	(b) Discuss following:	04
	Stress testing in ECG and Holter ECG	
	(c) Draw detailed block diagram of ECG machine. Explain each block in detail.	07
Q.4	(a) Discuss the functions of nervous system and give its detail classification.	03
	(b) Discuss the central nervous system in detail.	04
	(c) Enlist various types of instrumentation used for brain function measurement. Discuss any one technique in detail.	07

- Q.4** (a) Discuss various types of EEG signal with their significance. 03
(b) Draw & discuss the structure of neuron. Also give various types of neuron. 04
(c) Draw 10-20 international system of electrode placement in EEG machine. Also discuss block diagram of EEG machine. 07
- Q.5** (a) Draw network equivalent circuit of nerve/skeletal fibre. 03
(b) What is over-potential? Discuss different factors contributing to generation of over-potential 04
(c) Discuss various physiological effects of electricity on human body. 07

OR

- Q.5** (a) Enlist and discuss various susceptibility parameters related to electric shock. 03
(b) Discuss: Nernst formula, All or none law, Absolute refractory period, Relative refractory period. 04
(c) Explain various microshock hazards and macroshock hazards. 07

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