

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER- VI (New) EXAMINATION – WINTER 2019

Subject Code: 2161712

Date: 12/12/2019

Subject Name: Bio-Potential Instrumentation

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

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

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|------------|-----|--|-----------|
| Q.1 | (a) | Classify biomedical instruments. | 03 |
| | (b) | Explain Anatomy & Physiology of the heart. | 04 |
| | (c) | Draw and explain each block of generalized physiological measurement system of a human body. | 07 |
| Q.2 | (a) | Describe Nernst equation and G-H-K formulation for biopotential calculation in body. | 03 |
| | (b) | Define the following terms
(1) Signal to Noise Ratio (2) Noise Factor (3) Noise Figure (4) Noise Temperature | 04 |
| | (c) | Explain generation of Action potential with appropriate diagram. | 07 |
| | | OR | |
| | (c) | Discuss different types of noise. Enlist different strategies for noise reduction. | 07 |
| Q.3 | (a) | Enlist ideal characteristics of an Instrumentation amplifier. | 03 |
| | (b) | Write short note on Electrode half cell potential. | 04 |
| | (c) | Draw block-diagram of typical clinical ECG machine and describe each block in brief. | 07 |
| | | OR | |
| Q.3 | (a) | Explain chopper stabilized amplifier with neat diagram. | 03 |
| | (b) | Draw neat sketch of ECG waveforms & wigger's diagram & explain it. | 04 |
| | (c) | Explain ECG amplification and signal conditioning circuits. | 07 |
| Q.4 | (a) | Enlist types of Biopotential electrodes. Explain any one in brief. | 03 |
| | (b) | Explain ECG lead system in brief. | 04 |
| | (c) | What is EEG? Explain 10-20 electrode system | 07 |
| | | OR | |
| Q.4 | (a) | Classify EEG signals based on frequency ranges. | 03 |
| | (b) | Explain electro-conduction system of the heart. Discuss any three problems related to it. | 04 |
| | (c) | Explain the block diagram of EEG machine. | 07 |
| Q.5 | (a) | What is human nervous system? | 03 |
| | (b) | Discuss EEG recording modes. | 04 |
| | (c) | What is the difference between macroshock and microshock? Also discuss different sources contributing to generation of microshock. | 07 |
| | | OR | |
| Q.5 | (a) | Write a short note on Measurement Errors. | 03 |
| | (b) | Briefly explain maintenance techniques for ECG machine. | 04 |
| | (c) | Discuss physiological effects of electricity on human body in detail. | 07 |
