

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.

- 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 **04**
 (1) Signal to Noise Ratio (2) Noise Factor (3) Noise Figure (4) Noise Temperature
 (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**