# GUJARAT TECHNOLOGICAL UNIVERSITY
## BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2020

**Subject Code:2161712**                                              **Date:01/02/2021**
**Subject Name:Bio-Potential Instrumentation**
**Time:02:00 PM TO 04:00 PM**                              **Total Marks: 56**

**Instructions:**
1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

|  |  |  | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | Define bio-potential Instrumentation. | 03 |
|  | **(b)** | Which are the types of noises? Explain SNR. | 04 |
|  | **(c)** | Enlist the physiological systems in human body. Explain any one with neat diagram. | 07 |
| **Q.2** | **(a)** | Briefly explain ECG, EEG & EMG. | 03 |
|  | **(b)** | Enlist different strategies for noise reduction. | 04 |
|  | **(c)** | Explain Anatomy & Physiology of the heart. | 07 |
| **Q.3** | **(a)** | With proper diagram explain generation of bio potential from cell of a human body. | 03 |
|  | **(b)** | Draw and explain the isolation amplifier as a part of signal conditioning circuit. | 04 |
|  | **(c)** | Write short note on following.<br>a. Instrumentation Amplifier  b. Isolation amplifier | 07 |
| **Q.4** | **(a)** | Define polarizable and non-polarizable electrodes | 03 |
|  | **(b)** | Explain Tactics and signals processing for improved sensing. | 04 |
|  | **(c)** | Write short note on following.: (a) ECG readout devices<br>(b) Common ECG machine Faults & its troubleshooting | 07 |
| **Q.5** | **(a)** | What is resting state? | 03 |
|  | **(b)** | Explain electro-conduction system of the heart. | 04 |
|  | **(c)** | Discuss Commercial Medical Instrumentation Development Process | 07 |
| **Q.6** | **(a)** | What is micro shock and macro shock hazard? | 03 |
|  | **(b)** | Explain the classification of EEG signals as per frequency ranges. | 04 |
|  | **(c)** | Explain body surface electrodes with neat diagrams | 07 |
| **Q.7** | **(a)** | Define Electroencephalography. | 03 |
|  | **(b)** | Briefly explain maintenance techniques for ECG machine | 04 |
|  | **(c)** | Explain lead system of ECG in detail. | 07 |
| **Q.8** | **(a)** | Define Physiological effects of electricity. | 03 |
|  | **(b)** | Mention probable ECG faults and explain its trouble shooting. | 04 |
|  | **(c)** | What is EEG? Explain 10-20 electrode system | 07 |

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