

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3171104****Date:08/06/2022****Subject Name:Biomedical Electronics****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.
4. Simple and non-programmable scientific calculators are allowed.

MARKS

- Q.1**
- | | | |
|-----|--|-----------|
| (a) | Discuss the electrode-electrolyte interface. | 03 |
| (b) | Write different medical measurement constraints. | 04 |
| (c) | Draw and explain generalized medical instrumentation system. | 07 |

- Q.2**
- | | | |
|-----|---|-----------|
| (a) | Explain different types of noises. | 03 |
| (b) | Discuss the Ideal characteristics of an op-amp. Draw the circuit diagram of Instrumentation amplifier and derive its gain equation. | 04 |
| (c) | Explain design criteria and process for Biomedical Instrumentation commercially. | 07 |

OR

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|-----|---------------------------------------|-----------|
| (c) | Draw and explain isolation amplifier. | 07 |
|-----|---------------------------------------|-----------|

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Compare perfectly Polarizable and Nonpolarizable Electrodes | 03 |
| (b) | Briefly explain action potential and resting potential. | 04 |
| (c) | Draw detailed block diagram of ECG machine. Explain each block in detail. | 07 |

OR

- Q.3**
- | | | |
|-----|---|-----------|
| (a) | Discuss Nernst equation | 03 |
| (b) | Write short note on Electrode half-cell potential. | 04 |
| (c) | Explain the standard 12 lead system for ECG measurements in detail. | 07 |

- Q.4**
- | | | |
|-----|--|-----------|
| (a) | Discuss: Cranial x-rays. | 03 |
| (b) | Discuss the electrode skin interface and Motion artifact. | 04 |
| (c) | Draw 10-20 international system of electrode placement in EEG machine. Also discuss block diagram of EEG machine | 07 |

OR

- Q.4**
- | | | |
|-----|---|-----------|
| (a) | What is EEG telemetry? Briefly explain it. | 03 |
| (b) | Explain use of ultrasonic equipment for brain function measurement. | 04 |
| (c) | Explain body surface electrodes with neat diagrams | 07 |

- Q.5**
- | | | |
|-----|---|-----------|
| (a) | Discuss Organization of the nervous system. | 03 |
| (b) | Classify EEG signals based on frequency ranges. | 04 |
| (c) | Explain Macro shock Hazards in detail | 07 |

OR

- Q.5**
- | | | |
|-----|---|-----------|
| (a) | Explain structure and function of the central nervous system. | 03 |
| (b) | Enlist the typical EEG system faults. | 04 |
| (c) | Discuss various physiological effects of electricity on human body. | 07 |
