

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VI (NEW) EXAMINATION – SUMMER 2023****Subject Code:2161712****Date:14-07-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

| | | MARKS |
|------------|--|--------------|
| Q.1 | (a) Brief about various classification method of medical measurement systems | 03 |
| | (b) How medical parameter measurement is different than process parameter measurement? | 04 |
| | (c) Draw and explain functional block of generalized medical instrumentation system. | 07 |
| Q.2 | (a) List of the noises that can be introduced when ECG is measured. | 03 |
| | (b) Draw a normal ECG waveform with all its parameters. | 04 |
| | (c) How action potential is generated in certain cell of living species? | 07 |
| OR | | |
| | (c) Explain standard ECG lead system. What is Einthoven triangle? How Wilson terminal is formed? | 07 |
| Q.3 | (a) Brief about electro-conduction system of heart. | 03 |
| | (b) What is 'Over potential'? Discuss basic three mechanisms contribute to this phenomenon. | 04 |
| | (c) Discuss various layer of skin. Discuss equivalent circuit for electrode-skin interface in detail. | 07 |
| OR | | |
| Q.3 | (a) List out different types of body surface electrodes and internal electrodes. | 03 |
| | (b) Discuss 'Half-cell' potential of an electrode in detail. | 04 |
| | (c) State the differences between polarizable and non-polarizable electrodes. Brief about working of Silver/silver chloride electrode. | 07 |
| Q.4 | (a) What is Sodium - Potassium pump? | 03 |
| | (b) Discuss following heart problems: (i) Myocardial infarction (ii)Tachycardia-Bradycardia (iii) Premature Ventricular contraction (iv) Fibrillation | 04 |
| | (c) What is EEG? For what EEG is used? Brief about 10-20 electrode placement system. | 07 |
| OR | | |
| Q.4 | (a) Brief about bio-electric signals. List out types of bio-electric signals. | 03 |
| | (b) Brief about cell membrane structure. | 04 |
| | (c) Explain Right-leg driven circuit in detail. | 07 |
| Q.5 | (a) Draw a single structure of neuron. | 03 |
| | (b) What is reflex arc? | 04 |
| | (c) Explain microshock hazard and macroshock hazard in detail. | 07 |

OR

- Q.5** (a) Brief about susceptible parameters that will determine the effect of current on human body. **03**
- (b) Brief about different EEG recording modes. **04**
- (c) Discuss the psychophysical and physiological effects that occur in human as the magnitude of applied electric current progressively increases. **07**
