

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3151710****Date:22/01/2021****Subject Name:Biomedical Instrumentation****Time:10:30 AM TO 12:30 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.

- Q.1 (a) Draw and explain functional block of generalized medical instrumentation system. 03
- (b) Brief about various classification method of medical measurement systems. 04
- (c) Discuss medical measurement constrain in detail. 07
- Q.2 (a) Define homeostasis in your word. Brief about cell membrane. 03
- (b) How action potential propagate on i) single unmylielinated nerve fibre, and ii) single mylielinated nerve fiber. 04
- (c) How action potential is generated in certain cell of living species? 07
- Q.3 (a) Draw a normal ECG waveform with all its parameters. 03
- (b) Discuss following heart problems: 04
- (i) Myocardial infarction (ii)Tachycardia-Bradycardia (iii) Premature Ventricular contraction (iv) Fibrillation
- (c) Explain standard ECG lead system. What is Einthoven triangle? How Wilson terminal is formed? 07
- Q.4 (a) Explain the physiology of heart. 03
- (b) Explain electroconduction system of heart. 04
- (c) Explain Right-leg driven circuit in detail. 07
- Q. 5 (a) Brief about susceptible parameters that will determine the effect of current on human body. 03
- (b) Discuss the psychophysical and physiological effects that occur in human as the magnitude of applied electric current progressively increases. 04
- (c) Explain microshock hazard and macroshock hazard in detail. 07
- Q.6 (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.7 (a) Draw a single structure of neuron. 03
- (b) Discuss instrumentation used to measure anatomical and physiological parameters of the brain. 04
- (c) Brief about 10-20 electrode placement system. Also brief about different EEG recording modes. 07
- Q.8 (a) Brief about bio-electric signals. List out types of bio-electric signals. 03
- (b) What is “motion artifact” ? Justify: A motion artifact – a serious cause of interference in the measurement of bio-potential. 04
- (c) Discuss various layer of skin. Discuss equivalent circuit for electrode-skin interface in detail. 07
