

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.

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| 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:
(i) Myocardial infarction (ii)Tachycardia-Bradycardia (iii) Premature Ventricular contraction (iv) Fibrillation | 04 |
| | (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 |
