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Question Paper Code: 1215163

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024
Fifth Semester
Biomedical Engineering
U20BM503 - BIOMEDICAL INSTRUMENTATION
(Regulation 2020)

Time: Three Hours Maximum: 100 Marks

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. Summarize the general constraints to be considered in the design of medical instrumentation system.

2. Recall the principle of photoelectric transducers.

3. Write the Nernst equation for resting membrane potential.

4. What are evoked potentials Infer how evoked potentials are recorded?

5. Illustrate a simple method of respiration rate measurement.

6. Outline the drawbacks of Electromagnetic flow meter.

7. Recall the physiological parameters which can be measured using polygraph.

8. What is applanation tonometer? State its principle.

9. List the main therapeutic effects of ultrasonic diathermy.

10. Infer the main electrical safety considerations of electro medical equipment.

PART – B (5 x 16 = 80 Marks)

11. (a) (i) What is half Cell potential? Explain the methods to reduce the Half Cell potential. (8)
(ii) Illustrate the fundamental differences between polarizable and non-polarizable electrodes with suitable examples. (8)

(OR)

(b) (i)Summarize the characteristics which determine the performance and selection of a transducer for medical applications. (8)
(ii) Explain the working principle of Piezoelectric transducer with relevant sketch. (8)

12. (a) Make use of ECG waveforms and characteristics; With relevant sketches describe the standard 12 lead configuration used in ECG recording. (16)

(OR)

(b) (i) Explain the recording unit of EMG and identify the procedure for measurement of conduction velocity. (8)
(ii) Apply the knowledge of EOG and ERG and compare with respect to their functions. (8)

13. (a) Summarize the direct and indirect methods of monitoring blood pressure. Draw a typical set up of a pressure measuring system by direct method also Examine the circuit for measurement of systolic and diastolic pressure. (16)

(OR)

(b) (i) Write short notes on Cardiac output measurements. Analyze how quantitative measurement is done using dye dilution method. (8)
(ii) Explain the working of Ultrasonic blood flow meter using Doppler shift principle. (8)

14. (a) Summarize the concepts of Basal Skin Resistance (BSR) and Galvanic Skin Resistance (GSR). Interpret the basic steps to analyze GSR data. (16)

(OR)

(b) Draw the block diagram of basic audiometer, make use of a measurement procedure to perform audiometry test using pure tone audiometer. (16)

15. (a) Analyze the Shortwave and Microwave diathermy in terms of their mechanisms and its clinical applications. (16)

(OR)

(b) Examine the general precautions to be observed to minimize electric shock hazards. Identify the agencies responsible for setting up Electrical Safety Code for medical equipments at national and international levels. (16)

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