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Question Paper Code: U5B04

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2024

Fifth Semester

Biomedical Engineering

21UBM504 - BIOMEDICAL INSTRUMENTATION

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. Interpret the term Perfectly Polarized electrode. CO1-U
2. How half-cell potential is developed? Also state how do you record it? CO1-U
3. State the reason for measuring the electrical activity of muscles. CO1-U
4. Classify the types of bio signals. CO1-U
5. How does the Q-factor of a band pass filter affect its performance and selectivity? CO1-U
6. Outline the purpose of the right-leg drive circuit in ECG amplifiers. CO1-U
7. A patient's blood pressure is measured as 120 mmHg systolic and 80 mmHg diastolic. What is the MAP? CO2-App
8. Discuss the differences between systolic and diastolic blood pressure and their clinical implications. CO1-U
9. Give the pH values of arterial and venous blood. CO1-U
10. What is an auto analyzer? What are its advantages? CO1-U

PART – B (5 x 16 = 80 Marks)

11. (a) What is the role of the electrolyte in the electrode-electrolyte interface and explain how the electrode-skin interface impacts the quality of recorded bioelectric signals and the accuracy of diagnostic measurements. CO1-U (16)

Or

- (b) Explain briefly with neat diagram on calomel electrode and how it is used as a reference electrode in electrochemical determinations. CO1-U (16)
12. (a) Explain in detail on phonocardiogram with waveforms. and explain in detail on EOG recordings and interpret the patterns of eye movements displayed during different tasks or activities. CO1-U (16)
- Or
- (b) Briefly explain the physiological nature of ECG waveforms and Lead configurations. CO1-U (16)
13. (a) Design an AC carrier amplifier circuit for AM modulation with specific frequency and power requirements. CO2-App (16)
- Or
- (b) Design a mechanical and non-mechanical chopper amplifier circuit to convert low frequency signal into high frequency signal. CO2-App (16)
14. (a) Briefly explain an ultrasound blood flow measurement system tailored for assessing blood flow in a specific anatomical region or clinical application. CO1-U (16)
- Or
- (b) Describe the physiological basis of respiration rate measurement, including the role of the diaphragm and chest wall. CO1-U (16)
15. (a) Analyze the necessity of pH and pO₂ measurements in human body and briefly explain the methods to measure pH and pO₂. CO3-Ana (16)
- Or
- (b) Analyze the impact of variations in ISFET sensor fabrication and calibration procedures on measurement accuracy. CO3-Ana (16)