Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 81117

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fifth Semester

Computer Science and Engineering

OMD 551 — BASIC OF BIOMEDICAL INSTRUMENTATION

(Common to : Computer and Communication Engineering/Electrical and Electronics Engineering/Electronics and Communication Engineering/Electronics and Telecommunication Engineering/Artificial Intelligence and Data Science/ Computer Science and Business Systems/Information Technology)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define relative refractory period.

2. List the different types of surface electrodes.

3. Specify the frequency bands used for EEG analysis.

4. What is meant by bipolar mode of EEG measurement?

5. Write the essential function of a biopotential amplifier.

6. An ECG has a scalar magnitude of 1 mV on lead II and a scalar magnitude of 0.5 mV on lead III. Calculate the scalar magnitude on lead I.

7. What is meant by total lung capacity?

8. Define systolic blood pressure.

9. Classify blood cells.

10. List the various subsystems present in the auto analyzer.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the concept of resting and action potentials with the help of polarized and depolarized cells cross section.

Or

(b) (i) Explain the measurement of biopotentials with two electrodes and draw its equivalent circuit. (8)

(ii) Discuss about needle electrodes and give its advantages. (5)

12. (a) (i) Explain the origin of electrical activity of the heart with the help of a diagram. Draw a typical ECG waveform and label it. (5+3)

(ii) Discuss the bipolar mode of EMG measurement. (5)

Or

(b) Discuss in detail about the 10—20 lead system used for measuring EEG.

13. (a) With a neat sketch, explain how the CMRR can be improved using right leg driven ECG amplifier.

Or

(b) Write short notes on

(i) Power line interference. (8)

(ii) Isolation amplifiers. (5)

14. (a) Explain the auscultatory method of blood pressure measurement. Give its merits and demerits. (9+4)

Or

(b) Explain the principle behind Indicator Dilution method for measurement of cardiac output. Explain the working of dye dilution method. (6+7)

15. (a) Draw the simple block diagram of a spectrophotometer and discuss in detail the characteristics of each of the subsystems in the diagram.

Or

(b) Explain blood gas analyzers and their measurements in detail.

PART C — (1 × 15 = 15 marks)

16. (a) Explain the various standard lead positions used for recording ECG.

Or

(b) (i) With neat sketches, explain how an ultrasonic blood flow meter is used to measure the velocity of blood flowing in the blood vessels. (9)

(ii) Elucidate on the methods used for the detection of pulse changes due to blood flow. (6)