13/12/2023 - FN

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

Question Paper Code : 70492

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fifth Semester

Electronics and Communication Engineering

EC 8073 – MEDICAL ELECTRONICS

(Common to: Electronics and Telecommunication Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw a cell bio potential waveform showing the polarization and depolarization states with time and amplitude.

2. Recall the lead systems used to acquire biosignals from the heart and mention the points for placing electrodes at the body during recording.

3. Mention the functions of a pH electrode.

4. Interpret the use of a spirometer during lung diagnosis and define the tidal volume of the lung during breathing.

5. Compare ventilator with respirator.

6. List the different types of waveforms used in a defibrillator.

7. Analyze the features of ultrasonic-type diathermy.

8. Identify the two main circuits in a shortwave diathermy machine.

9. Recall the principle of telemedicine.

10. List the merits and demerits of the Brain-machine interface.

PART B — (5 × 13 = 65 marks)

11. (a) Interpret the reason for stating the brain potential measurement as a 10-20% electrode system and describe the same with a sketch used for EEG measurement.

Or

(b) Explain latent velocity and muscular action. Also brief EMG recording system with neat sketches and application of EMG in muscle diagnosis.

12. (a) Describe a laboratory method to measure PO_2 and PCO_2 of blood samples.

Or

(b) Examine the working principle of the electromagnetic blood flow meter with neat sketches.

13. (a) (i) Explain ventricular inhibited pacemaker Also, discuss how it is different from a ventricular synchronized one. (6)

(ii) Outline the significance of the relaxation process in magnetic resonance imaging. Also, compare T_1 and T_2 relaxation times. (7)

Or

(b) (i) Summarize the role of ventilators during surgical procedures. (6)

(ii) Discuss the mechanisms of respiration and the principle of ventilator operation. (7)

14. (a) Categorize the different diathermy techniques and explain shortwave diathermy for treating injured tissues.

Or

(b) Categorize the different modes of operation in surgical diathermy. Also, Compare surgical diathermy with microwave-type diathermy.

15. (a) Explain the telemedicine-based communication method with suitable sketches.

Or

(b) Elaborate on the principle of operation and application of radio pill.

PART C – (1 × 15 = 15 marks)

16. (a) (i) Compare and interpret normal and abnormal ECG signals with neat sketches. (7)

(ii) Generalize the international standard 12 lead system used to record ECG. (8)

Or

(b) (i) Discuss the characteristic features of implantable pacemakers and explain in particular the working of R-wave triggered pacemakers. (8)

(ii) Interpret the key factors and the values that decides kidney failure. Also explain the process of peritoneal dialysis to purify blood from impurities. (7)

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