Roll No. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. / B. Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, Nov/Dec 2024

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Semester VII

**EE 5028 – Medical Instrumentation**

(Regulation 2019)

Time: 3hrs Max.Marks: 100

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|---|---|
| CO 1 | Able to understand the fundamental art of biomedical engineering. |
| CO 2 | Able to understand the non-electrical parameters measurement and diagnostic procedures |
| CO 3 | Able to understand the concept of bio medical data acquisition and the working of EEG, ECG etc.. |
| CO 4 | Able to understand about imaging modalities and analysis through computer tomography. |
| CO 5 | Able to understand the life assisting, therapeutic and robotic devices and their technical applications. |

**BL – Bloom's Taxonomy Levels**

(L1 - Remembering, L2 - Understanding, L3 - Applying, L4 - Analysing, L5 - Evaluating, L6 - Creating)

## PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

| Q. No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 1 | Write a short note on the basic component of medical instrumentation system | 2 | CO1 | L1 |
| 2 | List the factors that decide the choice of a particular transducer to be used for the study of a specific parameter in Medical Instrumentation | 2 | CO1 | L2 |
| 3 | Define the term cardiac output with its formula | 2 | CO2 | L2 |
| 4 | What is GSR and how will it be measured. | 2 | CO2 | L2 |
| 5 | Write a short note on electrodes used to obtain the electrical activity in brain | 2 | CO3 | L2 |
| 6 | Write the principle of leakage current meter | 2 | CO3 | L2 |
| 7 | How can the fluoroscopic image be obtained? | 2 | CO4 | L2 |
| 8 | Write a short note on frequency modulation used in biotelemetry system | 2 | CO4 | L2 |
| 9 | Write a short note on muscle stimulator | 2 | CO5 | L2 |
| 10 | List the merits and demerits of heart lung machine | 2 | CO5 | L1 |

## PART- B (5 x 13 = 65 Marks)

| Q. No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 11 (a) (i) | Describe the generation of bio electric potential in the muscle with the necessary diagrams | 8 | CO1 | L3 |
| (ii) | Describe the tensile – stress behavior of soft tissues | 5 | CO1 | L4 |
| | OR | | | |
| 11 (b) (i) | Describe the structure and function of nervous system with a neat diagram | 7 | CO1 | L3 |
| (ii) | Describe the structure and function of kidney with a neat diagram | 6 | CO1 | L3 |
| 12 (a)(i) | Describe the indirect method of blood pressure measurement | 7 | CO2 | L3 |
| (ii) | Describe the theory of operation of blood gas analyzer with neat diagrams | 6 | CO2 | L3 |
| | OR | | | |
| 12 (b) (i) | Explain the construction and working of fingertip oximeter with neat diagram | 7 | CO2 | L3 |

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|---|---|---|---|---|
| (ii) | Explain the method to measure the partial pressure of CO2 with neat diagram. | 6 | CO2 | L3 |
| 13 (a) (i) | Explain the electrical activity of heart with the normal wave pattern of ECG with a neat diagram | 8 | CO3 | L4 |
| (ii) | Define half-cell potential and how is this potential developed in metal - electrolyte interface | 5 | CO3 | L4 |
| | OR | | | |
| 13 (b) | Describe the method of obtaining electrical signals for EEG and EMG recording | 13 | CO3 | L3 |
| 14 (a) | Explain the theory of operation of imaging techniques using magnetic resonance method with neat diagram | 13 | CO4 | L3 |
| | OR | | | |
| 14 (b) | Write the importance of retinal imaging and describe a method to obtain the retinal image with neat diagram. | 13 | CO4 | L4 |
| 15 (a) (i) | Describe the working of defibrillators with neat diagram | 7 | CO5 | L3 |
| (ii) | Describe the operation of ventilator with its block diagram | 6 | CO5 | L3 |
| | OR | | | |
| 15 (b) (i) | Discuss in detail about the function of audiometers | 6 | CO5 | L3 |
| | Describe the theory of operation of Pacemakers with neat diagram | 7 | CO5 | L3 |

## PART- C (1 x 15 = 15 Marks)

(Q.No.16 is compulsory)

| Q. No | Questions | Marks | CO | BL |
|---|---|---|---|---|
| 16.(i) | Describe the application of piezo electric transducer in the measurement of bioelectric signal | 7 | CO1 | L5 |
| (ii) | Explain the construction and working of fiber optic temperature sensor with neat diagram | 8 | CO1 | L4 |