



B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U18EIE0006: Bio Sensors and Medical Instrumentation

COURSE OUTCOMES

CO1: Explain the basics of biosensor and its types.

CO2: Discuss the different methods of electrical and nonelectrical medical diagnostic parameters.

CO3: Explain the basic parameters of the equipment used in electro-diagnosis and electro-therapy.

CO4: Appraise the role and uses of various assisting and therapeutic medical equipment.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|--|-----|-------------------|
| 1. Compare and contrast the different types of biosensors based on their sensitivity, selectivity, and response time. | CO1 | [K ₂] |
| 2. Evaluate the suitability of a particular biosensor for blood sugar measurement based on its transducer type and operating principles. | CO1 | [K ₂] |
| 3. What is the importance of signal conditioning in ECG? | CO2 | [K ₂] |
| 4. Mention differentiate EMG recording with EEG recording. | CO2 | [K ₂] |
| 5. Write down the significance of electrical safety measures in medical environments. | CO3 | [K ₂] |
| 6. List the significant shortfall in X-ray imaging which lead to the invention of CT imaging. | CO3 | [K ₂] |
| 7. How is M-mode imaging different from A-mode and B-mode in Ultrasound imaging? | CO3 | [K ₂] |
| 8. State the diathermy uses in medical treatment. | CO4 | [K ₂] |
| 9. Define ICCU patient monitoring system. | CO4 | [K ₂] |
| 10. Appraise the role of life assisting and therapeutic medical equipment in treating medical conditions, and compare and contrast their features. | CO4 | [K ₂] |

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

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|-----|----|---|----|-----|-------------------|
| 11. | a) | Explain the working of a glucose biosensor. | 8 | CO1 | [K ₂] |
| | b) | Discuss the different types of biosensors used for medical diagnosis. | 8 | CO1 | [K ₂] |
| 12. | a) | Discuss the anatomy and physiology of the heart and explain the ECG signal formation. | 10 | CO2 | [K ₂] |
| | b) | Explain the lead systems used for ECG measurements. | 6 | CO2 | [K ₂] |
| 13. | a) | Define blood pressure. Explain in detail about non-invasive blood pressure measurement techniques. | 10 | CO2 | [K ₂] |
| | b) | Explain the role of plethysmography in measuring respiratory rate. | 6 | CO2 | [K ₂] |
| 14. | a) | Explain the working principle and types of ventilators used in medical applications. | 8 | CO4 | [K ₂] |
| | b) | Discuss the principle, types and use of defibrillators. | 8 | CO4 | [K ₂] |
| 15. | a) | How is the presence of water molecules in the human body useful in MRI imaging? Explain in detail. | 8 | CO3 | [K ₂] |
| | b) | Compare the Computed Tomography of different generations. | 8 | CO3 | [K ₂] |
| 16. | a) | Explain the principle of operation of a pacemaker. Discuss the various modes of operation of pacemakers. | 8 | CO3 | [K ₂] |
| | b) | What are the complications associated with dialysis treatment? Discuss the measures to be taken to avoid these complications. | 8 | CO4 | [K ₂] |
