



**B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2022**

(Regulation 2018)

Fifth Semester

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**U18EEE0017: Biomedical Instrumentation**

**COURSE OUTCOMES**

- CO1: Understand the fundamentals of Biomedical Engineering**  
**CO2: Understand the measurement and diagnosis of non-electrical parameters**  
**CO3: Gain knowledge on various sensing and measurement of electrical parameters**  
**CO4: Acquire the basic principles in imaging techniques**  
**CO5: Understand the medical assistance/techniques, robotic and therapeutic equipments**

**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. Differentiate action potential and resting potential.  | CO1 | [K <sub>1</sub> ] |
| 2. Discuss the use of transducers in Biomedical Engineering.                                      | CO1 | [K <sub>2</sub> ] |
| 3. Define plethysmography.  | CO2 | [K <sub>1</sub> ] |
| 4. Give the normal value of pH, pCO <sub>2</sub> , pO <sub>2</sub> in human blood.                | CO2 | [K <sub>2</sub> ] |
| 5. Sketch a typical 'pqrst' complex waveform with respect to ECG.                                 | CO3 | [K <sub>1</sub> ] |
| 6. What are the uses of the electrode paste applied during biomedical recording?                  | CO3 | [K <sub>2</sub> ] |
| 7. Point out the advantages of MRI scan.  | CO4 | [K <sub>1</sub> ] |
| 8. What are the limitations of conventional radiology? How it is overcome in computed tomography? | CO4 | [K <sub>2</sub> ] |
| 9. List the types of implantable pacemakers.  | CO5 | [K <sub>1</sub> ] |
| 10. Illustrate Mean Airway Pressure (MAP).  | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-**

**PART B (5 x 16 = 80 Marks)**

**(Answer not more than 400 words)**

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|---|---|-----|-------------------|
| 11. a) Illustrate the working of a fibre optic temperature sensor.  | 8 | CO1 | [K <sub>2</sub> ] |
| b) How does the piezoelectric transducer produce ultrasonic waves? Create its electric equivalent near resonance. | 8 | CO1 | [K <sub>6</sub> ] |

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| 12. | a) | Illustrate the working principle of Doppler-shift blood flowmeter with block diagram.              | 8 | CO2 | [K <sub>2</sub> ] |
|     | b) | Explain with relevant equations the working and measurement procedure of Plethysmograph.           | 8 | CO2 | [K <sub>4</sub> ] |
| 13. | a) | Describe the common methods available for computerized analysis of EEG signals.                    | 8 | CO3 | [K <sub>3</sub> ] |
|     | b) | Explain the usage of non-mechanical chopper amplifier in biomedical measurement.                   | 8 | CO3 | [K <sub>4</sub> ] |
| 14. | a) | Describe the possibilities of occurrence of electrical accidents for a patient in a hospital.      | 8 | CO3 | [K <sub>3</sub> ] |
|     | b) | Explain the different factors which affect the accuracy of the recording related to biopotentials. | 8 | CO3 | [K <sub>4</sub> ] |
| 15. | a) | Describe in detail about the single channel telemetry system with block diagram.                   | 8 | CO4 | [K <sub>3</sub> ] |
|     | b) | Summarize the clinical applications of Endoscopy.  | 8 | CO4 | [K <sub>2</sub> ] |
| 16. | a) | Examine the role of nano robots in biomedical engineering field.                                   | 8 | CO5 | [K <sub>4</sub> ] |
|     | b) | Discuss the stone disease problem and the method used to overcome with a neat diagram.             | 8 | CO5 | [K <sub>6</sub> ] |

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