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## Fifth Semester B.E. Degree Examination, Jan./Feb. 2021

### Biomedical Instrumentation

Time: 3 hrs.

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

#### Module-1

- 1 a. What are biomedical signals? Explain the various sources of biomedical signals. (08 Marks)
- b. Describe the constraints to be considered in designing medical instrumentation system. (12 Marks)

OR

- 2 a. With equivalent circuits, explain metal-electrolyte interface. (08 Marks)
- b. How are silver-silver chloride electrodes prepared? (04 Marks)
- c. Describe the types of micro electrodes. (08 Marks)

#### Module-2

- 3 a. Give the block diagram description of ECG machine. (08 Marks)
- b. With figures, explain bipolar limb leads. (06 Marks)
- c. Discuss the effects of artefacts on ECG recordings. (06 Marks)

OR

- 4 a. Explain the computerized analysis of EEG. Give its waveforms. (10 Marks)
- b. With block diagram, explain the components of EMG recording system. Add a note on preamplifier circuit. (10 Marks)

#### Module-3

- 5 a. Explain the bedside patient monitoring system with block diagram. List its modular parts. (10 Marks)
- b. Define oximetry. Discuss the working principle and advantages of pulse oximetry. (10 Marks)

OR

- 6 a. With figures, explain the blood pressure measurement using oscillometric method. (10 Marks)
- b. Explain impedance pneumography and apnoea detectors. (10 Marks)

#### Module-4

- 7 a. Describe the principle of electromagnetic blood flow meter. (08 Marks)
- b. Explain the block diagram of Doppler shift blood flow meter. (06 Marks)
- c. Discuss the measurement of continuous cardiac output derived from the aortic pressure waveform. (06 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**OR**

- 8 a. What are the basic requirements of an implantable pacemaker circuit? Explain the types of implantable pacemakers. (10 Marks)  
b. Explain DC defibrillator with schematic diagram and waveform of discharge pulse. (10 Marks)

**Module-5**

- 9 a. Describe the basic units in Hemodialysis machine. (08 Marks)  
b. Discuss the classifications of ventilators. Explain the instrumentation system for recording continuous positive-airway pressure. (12 Marks)

**OR**

- 10 a. Give the precautions to be taken to minimize electric shock hazards. (10 Marks)  
b. Explain the tests needed for checking safety parameters of biomedical equipments. (10 Marks)

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