

# GBCS SCHEME

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18EI751

## Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Medical Instrumentation

Time: 3 hrs.

Max. Marks: 100

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

### Module-1

- 1 a. Define the term Biomedical Signal. List and discuss different types of biomedical signals. (10 Marks)
- b. With a neat block diagram, explain the functional components of a generalized medical instrumentation system. (10 Marks)

OR

- 2 a. With the help of a typical cell potential waveform, explain (i) polarization (ii) depolarization and repolarization processes of a human cell. (10 Marks)
- b. List and explain different types of electrodes used for recording the ECG signal. (10 Marks)

### Module-2

- 3 a. State Einthoven's law. Explain twelve lead ECG system used for ECG monitoring. (10 Marks)
- b. What are abnormal heart rhythms? Describe the major building block of ECG machine. (10 Marks)

OR

- 4 a. With the help of neat block diagram, explain EEG machine. (10 Marks)
- b. What are evoked potentials? Explain the computerized analysis of EEG signal. (10 Marks)

### Module-3

- 5 a. List and explain the types of techniques to calculate heart rate. (06 Marks)
- b. With neat block diagram, explain instantaneous heart rate meter (QRS matched filter). (08 Marks)
- c. Explain the principle of Korotkoff's method of blood pressure measurement with neat waveforms. (06 Marks)

OR

- 6 a. With suitable diagram briefly explain the principle of impedance pneumography used for respiration rate measurement. (10 Marks)
- b. Explain Apnoea detections with neat block diagram. (10 Marks)

### Module-4

- 7 a. With relevant waveforms and block diagram, explain working of square wave electromagnetic blood flow meter. (10 Marks)
- b. Explain the principle of Doppler shift blood flow velocity meter and also explain working with neat block diagram. (10 Marks)

OR

- 8** a. List the basic requirement of any implantable pacemaker. (06 Marks)  
b. Classify and explain different types of implantable pacemakers. (08 Marks)  
c. With neat diagram, explain pacer-cardioverter defibrillator. (06 Marks)

**Module-5**

- 9** a. With neat diagram, explain the working of pump oxygenators. (10 Marks)  
b. With functional block diagram, explain process Haemodialysis. (10 Marks)

**OR**

- 10** a. Give the general classification of ventilators and explain each of them. (10 Marks)  
b. List the hazardous situations encountered in medical environment. (05 Marks)  
c. List the precautions to be observed to minimize electric shock hazards. (05 Marks)

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VTU EXAMS FEB./MAR.2022