

GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 171006**Date: 28/12/2012****Subject Name: Biomedical Instrumentation****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Explain different lead configuration available for recording an ECG signal. Explain, in brief, different types of ECG recorders. **07**
- (b)** With neat sketches, describe the *depolarization* and *repolarization* process occurring in human cells. **07**
- Q.2 (a)** What is an *electrode*? Draw an equivalent circuit for measuring the biopotentials using two electrodes. Explain *microelectrodes* in brief. **07**
- (b)** Draw one ECG beat indicating typical amplitude and time values. Explain the physiology behind the development of ECG beat aided with cardiovascular circulation. **07**
- OR**
- (b)** Draw the diagram that relates *blood pressure* variations with *heart sounds* and ECG waveform. Explain, in brief, *indirect* method of measuring the blood pressure. **07**
- Q.3 (a)** Draw the block diagram of an *electrocardiograph* (ECG) machine and explain it in detail. **07**
- (b)** Explain *magnetic* and *ultrasonic* blood flowmeters with neat sketches. **07**
- OR**
- Q.3 (a)** Explain *electroencephalograph* (EEG) and *electromyograph* (EMG) machines with their block diagrams and discuss their applications. **07**
- (b)** What is *plethysmography*? Explain operating principles of different types of plethysmographs. **07**
- Q.4 (a)** What is a *pacemaker*? Explain *competitive* and *non-competitive* types of pacemakers. **07**
- (b)** Explain the principle of *electronomy*, *coagulation*, *fulguration* and *desiccation*. Also explain the surgical diathermy machine. **07**
- OR**
- Q.4 (a)** What is *fibrillation*? Explain ac and dc *defibrillators* with neat sketches and waveforms. **07**
- (b)** Explain the operating principle of *heart lung machine* and discuss its applications. **07**
- Q.5 (a)** Explain the principle of radiation. Draw and explain the block diagram of an x-ray machine. **07**
- (b)** Explain the operating principle of Ultrasound imaging. **07**
- OR**
- Q.5 (a)** Discuss the limitations of x-ray imaging. Explain the principle of CT imaging. **07**
- (b)** Explain the operating principle of positron emission tomography (PET). **07**
