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Total number of printed pages – 2

B. Tech  
PEEC 5416

## Seventh Semester Examination – 2013

### BIOMEDICAL INSTRUMENTATION

BRANCH : ENV, AEIE, EC, IEE, ETC

QUESTION CODE : C-147

Full Marks – 70

Time : 3 Hours

*Answer Question No. 1 which is compulsory and any five from the rest.  
The figures in the right-hand margin indicate marks.*

1. Answer the following questions : 2×10
- Write the sources of Biomechanical signal.
  - What are the advantages of Intelligent Medical Instrumentation system ?
  - Why the potential inside a cell is negative with respect to the potential outside the cell ?
  - Why Ag-AgCl electrodes are widely used in Biomedical Instrumentation ?
  - Define Gauge Factor of a Strain Gauge.
  - Distinguish between Absolute Pressure and Gauge Pressure.
  - What is meant by Signal Processing ?
  - Write few biological functions often needed for Patient Monitoring.
  - Sate Doppler effect.
  - Distinguish between Micro Shock and Macro Shock.
2. (a) Describe basic functional components of a Medical Instrumentation system. 5
- (b) Describe general constraints in design of Medical Instrumentation system. 5

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3. (a) Explain the following phenomena (i) Repolarization, (ii) Depolarization, (iii) Muscular Contraction. 5
- (b) What is Skin Contact Impedance ? Suggest a method for measurement of Skin Contact Impedance. 5
4. (a) Write the materials used for making Thermistor. What are the advantages of using Thermistors comparing to Thermocouples ? Suggest a method for linearization of a Thermistor. 5
- (b) Briefly explain various Biomedical signal analysis techniques. 5
5. (a) Draw schematic diagram of a self-balancing potentiometric recorder and explain its operation. 5
- (b) Briefly explain the importance of Einthoven triangle for configuration of ECG Leads. 5
6. (a) Briefly explain various methods used for measurement of Pulse Rate. 5
- (b) State Faraday's Law of Electromagnetic Induction and describe the principle of Electromagnetic Flow meter. Derive an expression of the Induced Voltage for measurement of Flow rate through blood vessel. 5
7. (a) Explain basic principle of operation of NMR Blood Flow Meter. 5
- (b) Explain classification of Leakage Currents according Current Path. 5
8. Answer any **two** of the following : 5×2
- (a) Electrodes for ECG – Construction and Operation
- (b) Effects of Artefact on ECG recording
- (c) Electric shock hazards and effect of electric current on human body.