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Total number of printed pages – 2

B. Tech  
PEEC 5416

**Seventh Semester Regular Examination – 2014**

**BIOMEDICAL INSTRUMENTATION**

**BRANCH : AEIE, EC, ETC, IEE**

**QUESTION CODE : H 274**

**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 purpose of using signal conditioning circuits in medical instrumentation system.
  - Why Ag-AgCl electrode is the most preferred electrode in biomedical instrumentation system ?
  - What is meant by Skin Contact Impedance ?
  - List the effects of motion artifacts on biomedical instrumentation system.
  - Distinguish between active and passive transducers.
  - "Improper grounding of the system is one of the most common causes of measurement problems and noise". Suggest a method to overcome this problem.
  - Write principle of operation of Crystal Microphone used for Phonocardiography.
  - Write the normal ranges of Heart Rate, Blood Pressure and Respiration Rate.
  - State Doppler effect.
  - What is meant by let-go-current ?

**P.T.O.**

2. (a) Briefly describe sources of various biomedical signals. 5  
(b) Describe general constraints and regulations in design of medical instrumentation system. 5
3. (a) Write the origin of bioelectric signal. Explain the phenomena of Repolarization, Depolarization and muscular contraction. 5  
(b) Briefly describe construction and advantages of using various types of electrodes for recording ECG. 5
4. (a) Write principle of temperature measurement using thermocouple and thermistor. Suggest a method of linearization of thermistor. 5  
(b) Describe various biomedical signal analysis techniques used in biomedical instrumentation. 5
5. (a) Describe construction and principle of operation of Potentiometric recorders. 5  
(b) Draw block diagram of a typical electrocardiograph and explain its operation. 5
6. (a) Explain various methods of measurement of heart rate. 5  
(b) Explain principle of electromagnetic flow meter. What is transformer voltage in sine wave flow meter ? Suggest methods of eliminating transformer voltage during measurement. 5
7. (a) With suitable diagram describe the theory and principle of flow measurement using Ultrasonic blood flow meter. 5  
(b) Briefly describe various electric shock hazards in biomedical instrumentation system. 5
8. Write short notes any **two** of the following : 5 × 2  
(a) Measurement of Skin Contact Impedance  
(b) Construction and principle of operation of biosensors  
(c) Principle of measurement of Respiration Rate.

