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Total number of printed pages – 3

B. Tech
PEEC 5416

Seventh Semester Examination – 2013

BIOMEDICAL INSTRUMENTATION

BRANCH : EEE, ELECTRICAL

QUESTION CODE : C-148

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 two examples of Bioelectric signals.
 - Write the purpose of using Signal Conditioning Circuits in Biomedical Instrumentation.
 - Draw a typical Electrocardiogram and label it.
 - Which part of the heart initiates electrical activity and acts as the primary Pace Maker of the heart ?
 - Distinguish between Active and Passive Transducers.
 - Write basic principle of operation of a Capacitive Pressure Sensor.
 - Improper rounding of the Instrumentation System is one of the most common causes of measurement problems and noise. Suggest a method for prevention of these problems.
 - List few Cardiac functions often needed for Patient Monitoring.



P.T.O.

- (i) State Faraday's Law of Electromagnetic induction.
- (j) What is Let-Go current ?
2. (a) Briefly describe the constraints in design of medical instrumentation system. 5
- (b) Write sources of the following biomedical signals : 5
- (i) Bio-mechanical signal
- (ii) Bio-acoustic signal
- (iii) Bio-chemical signal
- (iv) Bio-impedance signal.
3. (a) Describe construction and operation of various electrodes used for recording ECG signals. 5
- (b) What is motion Artefact ? Explain the causes and methods of reduction of motion Artefact. 5
4. (a) With suitable diagram describe the method of Pressure measurement using LVDT. 5
- (b) Describe principle of Temperature measurement using Thermocouple. Briefly explain the method of Reference Junction Compensation of Thermocouple. 5
5. (a) With suitable diagram describe the principle of operation of a Direct Writing Galvanometric Recorder. 5
- (b) Describe origin of heart sounds. Briefly describe construction and operation of various types of microphones commonly used for recording Phonocardiogram. 5
6. (a) Briefly describe the methods of measurement of Heart Rate. 5
- (b) Briefly describe method of measurement of Respiration Rate. 5

7. (a) Derive the expression of the Blood Flow Velocity in a Doppler Shift Blood Flow Meter. 5
- (b) Briefly describe types of leakage current and path of current which may be observed in Biomedical Instrumentation System. 5
8. Answer any **two** of the following : 5×2
- (a) Origin of Bio-electric signal – Repolarization and Depolarization
- (b) Bio Sensor – Construction and Principle of measurement
- (c) NMR Blood Flow meter – Construction and Principle of measurement.

