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Total number of printed pages – 2

B. Tech
PEEC 5416

Seventh Semester Back Examination – 2014

BIOMEDICAL INSTRUMENTATION

BRANCH (S) : EEE, ELECTRICAL

QUESTION CODE : L 178

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

- Define biomagnetic and bio-optical signals.
- Mention two important factors, which determine the design of a medical measuring instrument.
- What are the different types of microelectrodes ? Why are they used in biomedical instrumentation ?
- How is active transducer different than passive transducer ?
- Why isolation is required for signal conditioners in a biomedical instrument system ?
- What parameter is recorded by using an Electromyograph ?
- Mention different techniques used to calculate heart rate.
- Explain Apnoea. In which clinical situation does this occur ?
- Between a sine wave flow meter and a square wave flow meter, which one would be preferred and why ?
- How can you avoid leakage current for patient safety ?

2. (a) Draw the block diagram of a Laser Doppler flow meter and describe the operation.

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- (b) Show that the induced voltage is directly proportional to the flow rate through the blood vessel in an electromagnetic flow meter. 5
3. (a) How can you measure blood pressure using Korotkoff sounds ? 5
 (b) Describe the Pneumography method of respiration rate measurement using a schematic diagram. 5
4. (a) What is an electromyograph ? Describe the schematic diagram of an electromyograph set-up. 5
 (b) Discuss about various types of microphones used in phonocardiograph. 5
5. (a) Write the advantages of Fast Fourier Transform in biomedical signal analysis. 5
 (b) Illustrate, with the help of a block diagram, an isolation preamplifier used in modern ECG machines. 5
6. (a) Define Absolute pressure and Gauge pressure. What are the different units of pressure? Describe LVDT pressure transducer. 5
 (b) How body temperature can be measured using a silicon diode ? Draw the circuit diagram. 5
7. (a) From where do the bioelectric signals originate ? Draw a typical cell potential wave form. 5
 (b) What are the regulations of medical devices ? Describe the Regulations, Standards and Regulatory requirements. 5
8. Write short notes on any **two** : 5×2
 (a) Biosensors
 (b) NMR Blood Flow meter
 (c) Electroencephalograph
 (d) Electrodes for ECG.

