Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PCBM 4301

Fifth Semester Back Examination – 2014

ELEMENTS OF BIOMEDICAL INSTRUMENTATION

BRANCH (S) : AEIE, EC, EIE, ELECTRICAL, ETC, MECH

QUESTION CODE : L290

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

   (a) Differentiate between bioengineering and biochemical engineering.

   (b) What is polarizable electrode ?

   (c) Define bioelectric signal and bio-optical signals.

   (d) How does skin contact impedance affect the final record of measurement ?

   (e) Enumerate the advantage and disadvantage of limb electrode.

   (f) What parameter is recorded by using an Electromyograph ?

   (g) From the static characteristics of transducers define Drift and Noise.

   (h) Define Gauge Factor of a strain gauge.

   (i) Describe the advantages of thermistors over thermocouples.

   (j) Why Isolation Amplifiers are required in biomedical signal recording ?

2. (a) What are the sources of noise in low level measurements ? How can you avoid multiple grounds ? 5

   (b) List the general considerations for signal conditioners in biomedical instrumentation system. Explain them in brief. 5

3. (a) Name three types of thermocouples. Why reference junction compensators are required for thermocouples ? 5

   (b) Describe various Photoemissive cells. Draw the typical circuit configuration employed with photoemissive tubes. 5

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4. (a) What is an electrocardiogram ? Describe the different electrodes used for ECG with suitable diagrams. 5

(b) Discuss about various types of electrodes used in Electromyography. 5

5. (a) Illustrate the general block diagram of a medical instrumentation system and label the different blocks. Draw a typical cell potential wave form. 5

(b) How can you measure displacement using a Linear Variable Differential Transformer ? Describe with the help of a suitable schematic diagram. 5

6. (a) What are Photovoltaic cells ? Describe the constructional details of a barrier layer cell. 5

(b) How do the bioelectric signals originate ? Illustrate the electrical activity associated with one contraction in a muscle and explain. 5

7. (a) Draw a schematic diagram for interfacing analog signals to microprocessor. 5

(b) Discuss the performance requirements of medical instrumentation system. 5

8. Write short notes on any **two** : 5×2

(a) Electrode-tissue interface

(b) Floating Electrodes

(c) Biosensors

(d) Regulation of medical devices.