

Registration No. :

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Total number of printed pages – 2

B. Tech  
PEEC 5403

## Seventh Semester Examination – 2011

### BIOMEDICAL INSTRUMENTATION

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) Write the sources of Bioelectric and Bioacoustic signals.
  - (b) Why Ag-AgCl electrode is preferred in biomedical instrumentation ?
  - (c) What are the uses of Microelectrodes ?
  - (d) List the transducers used for body temperature measurement.
  - (e) Why biomedical signal analysis techniques are used ?
  - (f) What are “bipolar leads” ?
  - (g) Write the principle of operation of Direct Writing System.
  - (h) List the methods used for measurement of heart rate.
  - (i) Write the ranges of measurements of heart rate and blood pressure.
  - (j) Distinguish “macro shock” and “micro shock”.
2.
  - (a) Explain general constraints in designing medical instrumentation system. 5
  - (b) Describe with suitable diagram the generation of Action Potential and its' relation to Muscular Contraction. 5

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3. (a) Describe the method of measurement of Skin Contact Impedance. 5  
(b) Describe the construction of the electrodes used for ECG along with their merits and demerits. 5
4. (a) Describe the construction and application of various pressure transducers used in biomedical instrumentation system. 6  
(b) Describe the principle of operation of Glucose sensor (Bio sensor). 4
5. (a) What are the general considerations for Signal Conditioners ? 5  
(b) Draw a simple block diagram of electrocardiograph and describe functions of each block. 5
6. (a) What are the origins of heart sound ? 4  
(b) Describe the method of measurement of Respiration Rate. 6
7. Describe the construction, principle of operation, theory and use of electromagnetic blood flow meter. Explain the problems that are encountered if sinusoidal excitation voltage is used. Suggest methods to overcome the problems. 10
8. Write brief notes on any *two* : 5×2  
(a) Motion Artefacts  
(b) Phonocardiograph  
(c) Electric shock hazards.