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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) What are the sources of bioelectric and biochemical signals ?
 - (b) Draw a cross section of human heart and show the valves, arteries and veins.
 - (c) List the constraints while designing a measurement system for biomedical application.
 - (d) What is a “Smart Sensor”?
 - (e) List general considerations for Signal Conditioners.
 - (f) What is “Unipolar lead” in ECG ?
 - (g) What are the classifications of microphones based on their principle of operation used in Phonocardiograph ?
 - (h) List the techniques used for measurement of heart rate.
 - (i) Why Patient Monitoring Systems are used in hospitals ?
 - (j) Define “Let-Go” current.
2. (a) Describe the general constraints in designing medical instrumentation system. 5

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- (b) Draw the block diagram of a basic medical instrumentation system. Describe the functioning of each block. 5
3. (a) Describe the origin and generation of Action Potential. How is it related to muscular contraction ? 5
- (b) Describe the construction and application of Microelectrodes. 5
4. (a) Explain various Pressure Transducers in Biomedical Instrumentation. 5
- (b) What is Motion Artefacts ? How does it effect the measurement of ECG ? 5
5. (a) Draw a simple block diagram of Electrocardiograph and explain the functions of each block. 5
- (b) Describe biomedical signal analysis and processing techniques. 5
6. (a) What are the origins of heart sound ? 4
- (b) Explain the construction, principle of operation and use of Blood Pressure measurement. 6
7. (a) Write the principle of measurement of :
- (i) Electromagnetic Blood Flow meter
 - (ii) Ultrasonic Blood Flow meter
 - (iii) NMR Blood Flow meter
- (b) Describe electric shock hazards in biomedical devices. 4
8. Write brief notes on any *two* : 5×2
- (a) Electrodes for ECG
 - (b) Biomedical signal writing (recording) system
 - (c) Measurement of respiration rate