R09

SET-1

B.Tech II Year - II Semester Examinations, April-May, 2012
BIOTRANSDUCERS AND APPLICATIONS
(Bio-Medical Engineering)

Time: 3 hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks

- - -

1. With neat graphs and an example explain the following as applied to a measurement system.
   a) linearity   b) accuracy   c) hysteresis.   [15]

2.a) Briefly explain the thermocouple laws with neat sketches.
  b) List out the specifications of a thermocouple.   [8+7]

3.a) Explain the terms:
     i) Resistive transducer   ii) LVDT.
  b) Explain the working principle of Inductive transducer describing its merits and demerits.   [8+7]

4.a) Explain with neat diagrams the working principle of piezoelectric transducers.
  b) Describe in detail how piezo electric transducers are used to measure velocity.
                                                                               [8+7]

5.a) Draw a plot of blood pressure curve during systolic & diastolic conditions. Identify the axis.
  b) What are the different modes of blood pressure measurement?   [8+7]

6.a) Explain the principle of operation of an ultrasonic Doppler blood flow meter.
  b) What are its advantages over other techniques?   [8+7]

7.a) What are the features of a differential amplifier used in biomedical instrumentation?
  b) Explain the operation of an Op-Amp in inverting mode.   [8+7]

8. With neat block diagrams explain the transmission of biological data through radio telemetry.   [8+7]

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Code No: R09221102   R09   SET-2

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1.   Classify the various transducers used in the measurement of biosignals and explain in brief one biomedical application for each.   [15]

2.a)   Briefly explain the thermocouple laws with neat sketches.
  b)   List out the specifications of a thermocouple.   [8+7]

3.a)   Derive an expression for the gauge factor of resistive type of strain gauge.
  b)   Describe the applications of displacement transducer in biomedical engineering.
                                                                                                        [8+7]

4.a)   Explain ultrasonic transduction principles as applied to biomedical Instrumentation.
  b)   Describe the operation of velocity transducer based on Doppler system method.
                                                                                                        [8+7]

5.a)   What are ultrasonics? What is its frequency range in medical measurement?
  b)   What are the different types of ultrasonic transducers available for medical use? Describe with diagrams.   [7+8]

6.   What is dilution technique? Describe the Dye and thermo dilution methods.   [15]

7.a)   Explain Integrator circuit and its use in medical instrumentation.   [8+7]
  b)   Explain the merits of Op-Amp in biomedical applications.

8.   Describe with neat sketches the operation multi channel transmission methods used in telemetry.   [15]

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1.a)   Bring out the basic differences between the direct and indirect methods of measurement of biosignals.
  b)   Briefly explain the basic requirements of a bio transducer.   [8+7]

2.a)   Explain the theory behind P-N junction diode thermometer.
  b)   What is Seebeck effect and Peltier effect? Explain how measurement is done using Seebeck effect.   [7+8]

3.   What is capacitive transducer? Describe differential capacitive transducers and its applications in medicine.   [15]

4.a)   Explain the differentiation and integration techniques that are used to measure distance related parameters
  b)   Explain the operation of piezoelectric transducers. Mention its applications. [8+7]

5.   Explain with neat sketches and relevant graphs the occlusive cuff method of blood pressure measurement.   [15]

6.   Explain the constructional details and working of an electromagnetic flow meter.   [15]

7.   Design an instrumentation amplifier to be used for ECG amplification with a gain of 200.   [15]

8.   With a block diagram explain the functioning of FM transmission.   [15]

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1.   Give a neat block diagram of a typical medical measurement system and explain in detail all the elements present in it.   [15]

2.a)   What is peltier effect? Explain the different laws of thermocouple.
  b)   Draw and explain the circuit used for PN junction temperature transducer.   [7+8]

3.a)   Explain the principle of a strain gauge with neat sketches and relevant expressions.
  b)   From basic principles derive the gauge factor of a strain gauge.   [8+7]

4.   Explain the principle behind piezoelectric transducers and describe in detail with examples its biomedical applications.   [15]

5.   Explain the construction, working and applications of a catheter tip pressure transducer.   [15]

6.a)   Explain in detail plethysmography.
  b)   Compare its merits with other available methods.   [8+7]

7.   Explain the operation of ECG isolation amplifier with circuit diagram. Also mention few applications of it.   [15]

8.   With neat sketches explain transmitter and receiver systems used in telemetry and list their relative merits of the systems used.   [15]

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