

II B.Tech II Semester Regular Examinations, Apr/May 2006
BIO-TRANSDUCERS AND APPLICATIONS
(Bio-Medical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the following characteristics
 - (a) Linearity
 - (b) Accuracy
 - (c) Range
 - (d) Frequency response [4x4]
2. What is thermograph? Describe in detail with thermo graphic unit for medical use. How it can be used in determination of disease? [2+8+6]
3. Explain the method of linearization in a thermistor thermometer. With a neat circuit diagram explain the linearized thermistor temperature measuring circuit. [6+10]
4. (a) Explain the terms:
 - i. Resistive transducer
 - ii. LVDT. [4+4]

(b) Write the working principle of Inductive transducer. Describe its merits and demerits. [8]
5. (a) Explain the principle of operation of piezoelectric transducers with neat sketch.

(b) Explain in detail the velocity transducers used in medicine. [8+8]
6. How do you measure blood pressure? What are the methods and explain them in brief? [4+12]
7. (a) With necessary schematic and equations explain the theory behind electro-magnetic method of flow measurement.

(b) Describe the problems encountered in flow probes. [8+8]
8. What is radio telemetry? Describe radio telemetry system in reference to improving cardiac patients. [3+13]

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1. Explain the following characteristics
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 - (d) Frequency response [4x4]
2. What are the basic properties of thermistor? Describe cold (zero power) resistance and hot resistance of thermistor. [16]
3. (a) Write note on chemical thermometry. [8]
(b) Explain the terms:
 - i. Radiation thermometry.
 - ii. Clinical thermometry[4+4]
4. (a) Explain the terms:
 - i. Resistive transducer
 - ii. LVDT.[4+4]
(b) Write the working principle of Inductive transducer. Describe its merits and demerits. [8]
5. (a) Describe a transducer that can be used to measure angular velocity.
(b) Describe in detail the piezo electric transducers used to measure acceleration. [8+8]
6. (a) Explain the electrical transduction method of measurement of BP.
(b) Explain the operation of optical transducer. Mention its applications. [8+8]
7. Describe a Doppler system in relation to blood flow with diagram and mathematical relation. [16]
8. (a) Explain the principle behind bioelectric amplifiers.
(b) Write about differentiator circuit with neat schematic and derive the equation for the output voltage. [6+10]

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1. Explain the following characteristics
 - (a) Linearity
 - (b) Accuracy
 - (c) Range
 - (d) Frequency response [4x4]
2. (a) Explain the principle and measurement of temperature using a thermocouple.
(b) What are the medical applications of thermistors. Explain in detail. [8+8]
3. (a) Explain the principle of photoconductive and photovoltaic detectors.
(b) With a neat diagram explain the thermistor bolometer. [8+8]
4. Explain the basic principle of phonocardiography? How can you measure phonocardiographic signals by using variable inductance pressure transducer? [4+12]
5. Write short notes on
 - (a) Elastic transducer
 - (b) Capacitive transducer.
 - (c) Optical transducer. [5+6+5]
6. With a neat diagram explain about a piezoelectric transducer. Also explain how it can be used as an arterial pressure sensor? [16]
7. Describe a Doppler system in relation to blood flow with diagram and mathematical relation. [16]
8. (a) Explain the block diagram of single channel biotelemetry system?
(b) Explain the difference between frequency division multiplexing and time division multiplexing. [8+8]

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1. (a) What is aliasing? Explain how it can be minimized?
(b) What is the effect of hysteresis in biomedical transducers explain in detail?
[8+8]
2. What is thermograph? Describe in detail with thermo graphic unit for medical use.
How it can be used in determination of disease? [2+8+6]
3. (a) Name the different methods used in chemical thermometry. Explain any one method.
(b) Explain pyroelectric detectors with a neat diagram. [8+8]
4. Describe in detail the operation of a carrier amplifier and phase sensitive detector for L.V.D.T with block diagrams. [16]
5. Write short notes on
(a) Elastic transducer
(b) Capacitive transducer.
(c) Optical transducer. [5+6+5]
6. Explain the principle of operation of fiber optic pressure transducers. List its advantages. Describe the application of force balance method of pressure measurement.
[4+2+10]
7. Describe a Doppler system in relation to blood flow with diagram and mathematical relation. [16]
8. What are the features of a differential amplifier used in biomedical instrumentation? How the linearity and the frequency response of the amplifier are is improved?
[8+4+4]
