

**II B.Tech II Semester Supplementary Examinations,  
November/December 2005  
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 thermistor? Give the basic science of the thermistor with circuit symbols and packing style. A thermistor has a positive temperature coefficient of  $+0.002\Omega / \Omega / ^\circ\text{C}$  at  $25^\circ\text{C}$ . What is its resistance at  $98.6^\circ\text{C}$  if the normal resistance is  $12.1\text{k}\Omega$ ? [3+6+7]
3. (a) Write note on chemical thermometry. [8]  
(b) Explain the terms:
  - i. Radiation thermometry.
  - ii. Clinical thermometry[4+4]
4. Explain the basic principle of phonocardiography? How can you measure phonocardiographic signals by using variable inductance pressure transducer? [4+12]
5. Explain principle behind photo- electric and piezoelectric transducers and its bio-medical applications. [8+8]
6. (a) Explain the set-up to record the blood pressure of a patient continuously  
(b) Describe implantable pressure transducers used to measure biological pressures. [8+8]
7. Explain the various methods of blood flow measurement. [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]

\*\*\*\*\*

**II B.Tech II Semester Supplementary Examinations,  
November/December 2005  
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. What is capacitive transducer? Describe differential capacitive transducers and its applications in medicine. [2+10+4]
5. Explain about the velocity transducers based on electromagnetic principle. Describe one application with neat schematic. [16]
6. Describe the noninvasive method of blood pressure measurement using electronic processing? What are the limitations of the method and how can they be overcome? [16]
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]

\*\*\*\*\*

**II B.Tech II Semester Supplementary Examinations,  
November/December 2005  
BIO-TRANSDUCERS AND APPLICATIONS  
(Bio-Medical Engineering)**

**Time: 3 hours****Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

\*\*\*\*\*

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 thermistor? Give the basic science of the thermistor with circuit symbols and packing style. A thermistor has a positive temperature coefficient of  $+0.002\Omega / \Omega / ^\circ\text{C}$  at  $25^\circ\text{C}$ . What is its resistance at  $98.6^\circ\text{C}$  if the normal resistance is  $12.1\text{k}\Omega$ ?  
[3+6+7]
3. (a) Write note on chemical thermometry. [8]  
(b) Explain the terms:
  - i. Radiation thermometry.
  - ii. Clinical thermometry[4+4]
4. Explain the circuit used to monitor respiration in infants using two-coil inductive transducer? [16]
5. Write short notes on
  - (a) Elastic transducer
  - (b) Capacitive transducer.
  - (c) Optical transducer. [5+6+5]
6. What is ultrasonic? What is its frequency range in medical measurement? What type of waves are these? What are the different types of ultrasonic transducers available for medical use? Describe with diagrams. [2+3+2+9]
7. Explain the various methods of blood flow measurement. [16]
8. Design an instrumentation amplifier to be used for ECG amplification with a gain of 200. [16]

\*\*\*\*\*

**II B.Tech II Semester Supplementary Examinations,  
November/December 2005  
BIO-TRANSDUCERS AND APPLICATIONS  
(Bio-Medical Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions  
All Questions carry equal marks**

\*\*\*\*\*

1. (a) Explain Signal to noise ratio with reference to the bio transducers
- (b) Explain Stability with reference to the bio transducers
- (c) A wheat stone bridge shown below consisting the following resistance  $R_1=2\text{ K}\Omega$ ,  $R_2=1\text{ K}\Omega$ ,  $R_3=10\text{ K}\Omega$  &  $R_4=5\text{ K}\Omega$ . Show that the null condition exists.(figure 1 [4+4+8])

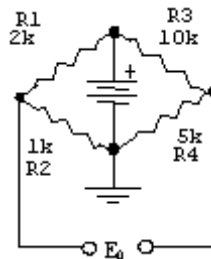


Figure 1:

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) Give the classification of infrared detectors in temperature measurement and explain any one detector.
- (b) Describe the advantages and disadvantages of photovoltaic cells. [9+7]
4. Explain the construction of elastic strain gauge? What are the problems associated with the use of elastic resistance strain gauges how can you find such a small resistance. [7+4+5]
5. Write short notes on
  - (a) Elastic transducer
  - (b) Capacitive transducer.
  - (c) Optical transducer. [5+6+5]
6. List different methods used for measurement of pressure in an organism. Explain any one method with necessary schematic. [16]

7. Describe Pascal principle and how can be related to physiological blood flow. [16]
8. (a) Describe portable telemetry system with diagram.  
(b) Explain the term CMRR  
(c) Write a note on log amplifier. [8+3+5]

\*\*\*\*\*