Code No: 07A41102 **R07** **Set No. 2**

II B.Tech II Semester Examinations,December 2010
BIOTRANSDUCERS AND APPLICATIONS
Bio-Medical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (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. [8+8]
2. (a) What is Mossbauer Effect?
   (b) Explain the emission and absorption lines for a nuclear transition and recoil energy. [8+8]
3. (a) Explain the principle behind bioelectric amplifiers.
   (b) Write about differentiator circuit with neat schematic and derive the equation for the output voltage. [8+8]
4. (a) Describe in detail the oscillatory method of pressure measurement.
   (b) Explain the Doppler ultrasound method of measuring pressure. [8+8]
5. (a) Explain the terms:
      i. Resistive transducer
      ii. LVDT.
   (b) Write the working principle of Inductive transducer. Describe its merits and demerits. [8+8]
6. Define wave synthesis? Explain how a square wave is generated from 1^{st} , 3^{rd} and 5^{th} harmonics with necessary sketches. [16]
7. (a) Discuss on the choice of radio frequency and also its frequency allocations for medical applications.
   (b) Discuss on the various standards required for medical applications and also the importance of the bio-telemetry. [8+8]
8. (a) Describe the cardiac output measurement using indicator dilution technique.
   (b) write short notes on Fick and rapid injection indicator dilution methods.[8+8]

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Code No: 07A41102 **R07** **Set No. 4**

II B.Tech II Semester Examinations,December 2010
BIOTRANSDUCERS AND APPLICATIONS
Bio-Medical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Name the different methods used in chemical thermometry. Explain any one method.
   (b) Explain pyroelectric detectors with a neat diagram. [8+8]
2. Derive expression for Ad and Ac of an instrumentation amplifier with the help of suitable example. [16]
3. (a) Explain the principle of an ultrasonic Doppler blood flow meter.
   (b) What are its advantages over other techniques? [8+8]
4. (a) With a neat diagram explain about single channel telemetry system.
   (b) Discuss about biosignal transmitters and receivers. [8+8]
5. Describe the various types of displacement transducers that can be used in vitro and in vivo. [16]
6. (a) Explain ultrasonic transduction principles.
   (b) Describe velocity transducer based on Doppler system method. [8+8]
7. (a) Explain the direct hydraulically coupled catheter type pressure transducer.
   (b) Explain the diaphragm displacement type pressure transducer. [8+8]
8. (a) What are the power supply requirements of a general purpose measurement system?
   (b) Explain the dynamic characteristics involved in interrupting the stability of the measurement system. [8+8]

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Code No: 07A41102 **R07** **Set No. 1**

II B.Tech II Semester Examinations,December 2010
BIOTRANSDUCERS AND APPLICATIONS
Bio-Medical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the catheter-tip pressure transducer with neat sketch.
   (b) Describe the implantable pressure transducers and its applications. [8+8]
2. Explain the circuit used to monitor respiration in infants using two-coil inductive transducer? [16]
3. With neat circuit diagrams, explain integrator and differentiator circuits needed in telemetry systems. [16]
4. (a) Explain in detail the displacement transducer.
   (b) Give a detailed account of translational accelerometers. [8+8]
5. (a) Explain in detail about Fick and rapid injection indicator dilution method.
   (b) Write short notes on water filled plethysmography. [8+8]
6. Write short notes on:
   (a) Properties of Op-Amp
   (b) Signal conditioning circuits.
   (c) Radio Telemetry for biological signals.
   (d) Integrator and Differentiator. [4+4+4+4]
7. What is thermistor? Give the basic science of the thermistor with circuit symbols & packing style. A thermistor has a positive temperature coefficient of +0.002 Ω / Ω/^{0}C at 25 ^{0}C. What is its resistance at 98.6 ^{0}C if the normal resistance is 12.1k Ω? [16]
8. Explain the concept of multi point calibration in adaptive measurement systems with neat sketch. [16]

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Code No: 07A41102 **R07** **Set No. 3**

II B.Tech II Semester Examinations,December 2010
BIOTRANSDUCERS AND APPLICATIONS
Bio-Medical Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the principle and design of a thermo resistive transducer.
   (b) Explain the following terms:
      i. Thermometer
      ii. PN diode. [8+4+4]
2. Explain the terms CMRR and common mode signal. What are the common mode noise in ECQ signal? Explain how an ideal differential amplifier eliminates commom mode signal. [16]
3. (a) With respect to bio-transducer, explain aliasing problem and sampling errors.
   (b) Differentiate between active and passive transducers with examples. [8+8]
4. (a) Explain the various types of implantable pressure transducer.
   (b) Describe on the semiconductor type pressure transducer. [8+8]
5. (a) Explain the principle of a strain gauge.
   (b) Derive the gauge factor of a strain gauge. [8+8]
6. What is the physics behind ultrasound waves? An ultrasound wave propagating in human tissue has a frequency of 9.1 MHz calculate the wavelength? [16]
7. (a) Describe the instrument required for measuring cardiac output with the help of neat circuit.
   (b) Discuss on the plethysmography method and its uses in biomedical field.[8+8]
8. (a) What is radio telemetry and its requirement to medical field.
   (b) Describe the radio telemetry system useful to improve the cardiac patients condition. [8+8]

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