BITS PILANI DUBAI CAMPUS
KNOWLEDGE VILLAGE, DUBAI

IV Year EEE&EIE – I Semester 2005-06
COMPREHENSIVE EXAM
MEDICAL INSTRUMENTATION

Date: 5/1/06 Time: 3 Hrs
Max. Marks: 60 Weightage: 40%

Answer ALL Questions

1. (a) Differentiate between the principles involved in active and passive transducers. (2M)
   (b) Explain the transducers based on the thermoelectric effect. (4M)
   (c) Describe the pressure transducers for biomedical applications. (4M)

2. (a) Explain the construction and working of the following bio potential electrodes.
   (i) Microelectrodes (3M)
   (ii) Skin and surface electrodes (4M)
   (iii) Needle electrodes. (3M)

3. (a) What are the characteristics of blood flow. Explain (5M)
   (b) Describe any TWO types of ECG recorders. (5M)

4. (a) Explain the working of the instrument for recording heart sounds. (5M)
   (b) How does the CRT displays for patient monitoring systems work. (5M)

5. (a) What are the different modes in which respirators can be operated. Explain. (5M)
   (b) Discuss the basic modes of ultrasound transmission. (5M)

6. (a) What are the different methods of measuring neuronal firing. Discuss. (5M)
   (b) Explain the working of the instrument used for psycho physiological measurement. (5M)

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IV Year EEE&EIE – I Semester 2005-06
Test2
MEDICAL INSTRUMENTATION

Date: 11/12/05
Max. Marks: 30

Time: 50mts
Weightage: 20%

Answer ALL Questions

1. Why are the vector sums of the projections on the frontal plane cardiac vector at any instant onto the three axes of the Einthoven triangle zero. (3M)

2. You are asked to measure blood pressure and blood volume in an anesthetized dog lying on an operating table. Design a system to do this by
   (i) describing the transducers
   (ii) Specifying all necessary instrumentation. (8M)

3. Discuss possible causes of a patient monitoring falsely indicating an excessive high heart rate. (5M)

4. What equipment you need in a diagnostic catheterization laboratory. (5M)

5. For what measurements can a spirometer be used. Give the measurements that cannot be measured by a spirometer. Why. (5M)

6. A patient has a heart problem that seems to suggest mitral valve stenosis. Discuss the transducer you would specify to perform a diagnosis. (4M)

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IV Year EEE&EIE – I Semester 2005-06
Test1
MEDICAL INSTRUMENTATION

Date: 23/10/05
Max. Marks: 40

Time: 50mts
Weightage: 20%

Answer ALL Questions

1 (a) Explain any FOUR factors to be considered while designing a medical instrumentation system. (6M)
(b) Name the problems encountered in measuring a living system. (4M)

2. Explain the following transducers with reference to biomedical applications.
(i) Force transducer (5M)
(ii) Pressure transducer (5M)

3. (i) Differentiate between Polarization and Depolarization of a cell. (3M)
(ii) Show the waveform of an Action potential marking all relevant data. (1M)
(iii) Show the equivalent circuit of a bio potential electrode. (2M)
(iv) Describe the functioning of Microelectrodes. (4M)

4.(a) Explain the following terms
Cardiac output, Stroke Volume, Mean circulation time (4.5M)
(b) Explain the relationship between Heart sounds and the Cardiovascular system. (5.5M)