BITS, PILANI-DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY
IV Year EIE – II Semester 2011-12
COMPREHENSIVE EXAMINATION
MEDICAL INSTRUMENTATION –INSTR 481

Date: 10-6-2012 Time: 3 Hrs
Max. Marks: 40 Weightage: 40 %

Answer ALL Questions
ALL Questions carry Equal marks

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1. (a) Draw the circuit for detecting the systolic and diastolic pressures. Explain the same.
   (b) Draw the block diagram of a magnetic blood flow meter. Explain the waveforms used in magnetic blood flow meter.

2. (a) What is impedance plethysmography. Explain various methods of impedance plethysmography.
   (b) Draw the block diagram of a demand type synchronous pacemaker and explain it working.

3. Design the block diagram of a temperature controller to maintain the temperature of air inside an infant incubator. The system should also monitor the oxygen content in the incubator. (Incubator is a temperature controlled chamber where premature newborns are kept).

4. (a) An ICU has four beds with bedside monitors. These are to be linked to a centralized nursing station which has facility for recording, display and alarms. Show the block diagram of the layout. Each bedside monitor is capable of monitoring ECG, Heart rate, temperature and respiration rate.
   (b) Impedance pneumography is one way of measuring respiration. Draw the block diagram and explain the working of impedance pneumograph.

5. (a) What are the basic modes of transmission of ultrasound. Explain.
   (b) Show the block diagram of a three channel time division multiplexed radio telemetry system and explain.

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IV Year EIE – II Semester 2011-12
TEST2 (Open Book)
MEDICAL INSTRUMENTATION –INSTR 481

Date: 8-5-2012 Time: 50mts
Max. Marks: 20 Weightage: 20 %

Answer ALL Questions
ALL Questions carry Equal marks
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1) A cardioverter is an instrument where the defibrillation pulse is synchronized with R wave of ECG. Suggest the possible block diagram design of a cardioverter.

2) Design an atrial synchronous cardiac pacemaker which detects electric signals corresponding to the contraction of the atria and stimulates the ventricles.

3) Design a biofeedback system to control the heart rate of patient with tachycardia.

4) Describe an electronic method to record the respiratory activity.

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IV Year EIE – II Semester 2011-12
TEST1
MEDICAL INSTRUMENTATION –INSTR 481

Date: 20-3-12 Time: 50mts
Max. Marks: 25 Weightage: 25 %

Answer ALL Questions
ALL Questions carry Equal marks

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1) (a) Explain the working of LVDT to be used in medical instrumentation. Show the characteristics, and mention disadvantages.
   (b) Physicians have shown that temperatures of joints are closely correlated with the local inflammation. Suggest a suitable transducer to measure the temperature and show its characteristics.

2) Give the block diagram design of an analyzer to analyze EEG waves. The analyzer should be capable of displaying the waveform and its spectrum also.

3) EMG frequencies can reach up to 5 kHz. Design an amplifier circuit that will amplify the EMG signal by a factor of 1000 and also pass the frequencies specified.

4) Explain the various Lead configurations to record ECG.

5) Draw the block diagram of an ECG machine and explain the same.

BITS PILANI, DUBAI CAMPUS
SECOND SEMESTER 2011- 2012
IV YEAR-- QUIZ - 2

Course Code: INSTR C481
Course Title: Medical Instrumentation
Duration: 20 minutes

Date: 22.4.2012
MaxMarks: 7
Weightage: 7%

Name: ..... ID No: .....

1. Give the relationship of the amplitude of R wave in Lead I, lead II and lead III.

2. What is Mariott lead. How is it simulated.

3. What does an exercise stress test system consist of.

4. What is mean arterial pressure. How is MAP calculated.

5. Name FOUR methods of direct blood pressure measurement by a method which the measuring device was coupled to the patient.

6. Name FOUR methods of blood flow measurement clearly mentioning whether the method measures flow or velocity.

7. (i) What is the frequency response of a microphone used to record phonocardiogram.

(ii) What is the upper frequency limitation of a pen recorder.

BITS PILANI, DUBAI CAMPUS
SECOND SEMESTER 2011- 2012
IV YEAR-- QUIZ 1

Course Code: INSTR C481
Course Title: Medical Instrumentation
Duration: 20 minutes

Date: 8.3.2012
MaxMarks: 8
Weightage: 8%

Name: ..... **ID No:** .....

1. What are the errors to be considered for an accurate measurement.

2. What are artifacts.

3. What is piezoelectric effect. Name two piezoelectric materials.

4. Name two types of transducers to measure Force, Displacement.

5. Give the setup to measure Force using optical methods.

6. Give the following: (i) Duration of action potential in nerve and muscle cells (ii)Duration of action potential in heart muscle (iii) propagation velocity of action potentials in nerves (iv) propagation velocity of action potentials through heart muscle.

7. Identify QRS complex with events related to the action potential propagation.

8. What is (i) Electro retinogram (ii) Electro occulogram