BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
COMPREHENSIVE EXAMINATION
MEDICAL INSTRUMENTATION – INSTR C481

Date: 23-5-2010
Time: 3 Hrs

Max Marks: 40
Weightage: 40%

1. (a) Describe the construction of fluid column blood pressure transducer. (4M)
   (b) Describe the construction and working of plethysmograph to measure the total amount of blood flowing into the limbs. (4M)

2. (a) What are the common and useful elements found in the cardiac monitoring system. Explain. (3M)
   (b) What is fibrillation and how it is corrected. Draw the circuit of a capacitive discharge defibrillator and explain its working. (5M)

3. (a) Explain the requirements for respiratory gas flow measurements. (3M)
   (b) Suggest the block diagram of an instrumentation system for recording pressure and temperature of inspired air coming from a continuous positive airway pressure apparatus. (5M)

4. (a) Explain the neuronal firing measurements. (4M)
   (b) How do you measure BSR and GSR. Explain. (4M)

5. Give the block diagram design of a system that would provide visual feedback to a subject who wished to maximize the amplitude of his EEG alpha waves. (8M)

BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
TEST2 (Open Book)
MEDICAL INSTRUMENTATION – INSTR C481

Date: 18-4-2010
Time: 50 Mts

Max Marks: 20
Weightage: 20%

1. The output of a bio potential preamplifier that measures the electro oculogram is an undesired voltage of ± 5V dc with a desired signal of ± 1V superimposed. Design a circuit that will balance the dc voltage to zero and provide a gain 0f -10 for the desired signal. (5M)

2. Design a block diagram of a system that will detect QRS complexes of the ECG even when the amplitude of the T wave exceeds that of QRS complex and provides output signals suitable for counting these complexes on a counter. (5M)

3. Suggest and explain a method that really measures the blood flow and not the blood velocity. Give the equation for calculating cardiac output. (5M)

4. Suggest suitable pacemaker when the patient can establish normal cardiac rhythm between periods of block. (5M)

BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
TEST1 (Closed Book)
MEDICAL INSTRUMENTATION – INSTR C481

Date: 7-3-2010 Max Marks: 25
Time: 50 Mts Weightage: 25%

1. Draw the block diagram of a man-instrument system. Explain the various components. (5M)

2. Explain the sensors for the measurement of
   (i) Air flow (2M)
   (ii) Volume changes (2M)
   (iii) Angular displacement. (1M)

3. (i) How do the action potentials propagate. (1M)
   (ii) Describe the EEG activity and how does it vary in sleep. (2M)
   (iii) Briefly explain EMG, ERG, EOG and EGG (2M)

4. Design a sensor and system to detect asthma by measuring expansion of the chest. (5M)

5. (a) Draw the figure to show the relation between heart sounds and ECG and explain the same. (2.5M)
   (b) Give the normal values for amplitudes and durations of important ECG parameters. (2.5M)

NAME :

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BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
QUIZ 2
MEDICAL INSTRUMENTATION – INSTR C481

Date: 5-5-2010
Time: 20 Mts

Max Marks: 14
Weightage: 7%

Answer ALL Questions

1. Define Tidal volume and Total lung capacity.

2. What is Respiratory minute volume and Forced vital capacity.

3. Draw the Spirogram and indicate the following: Vital capacity(VC), Tidal volume(TV), Residual volume(RV), Inspiratory reserve volume(IRV).

4. Differentiate between Systemic temperature and Skin temperature.

5. Draw the Resistance -Temperature relationships of copper and Thermistor.

6. Name FOUR basic modes of Ultrasound transmission.

7. Give FOUR factors to be considered in selecting a transducer for echocardiographic investigation.

NAME :

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BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI
QUIZ 1
MEDICAL INSTRUMENTATION – INSTR C481

Date: 24-3-2010
Time: 20 Mts

Max Marks: 8
Weightage: 8%

Answer ALL Questions

1. Draw the circuit of an Instrumentation amplifier with single ended output.

2. Name TWO requirements of a biomedical recorder.

3. How isolation of the patient is obtained while recording ECG.

4. Name any TWO sources of interferences that can affect ECG recording.

5. What is the information provided by the vector cardiogram.

6. Name the TWO types of microphones used in phonocardiography.

7. Name the different subsystems in a exercise stress test system.

8. Name the methods used for recording fetal ECG.