

BITS, PILANI-DUBAI
DUBAI INTERNATIONAL ACADEMIC CITY
IV Year EIE – I Semester 2010-11
Comprehensive Examination
MEDICAL INSTRUMENTATION -INSTRc481

Date: 29/12/10

Max. Marks: 40

Time: 3 Hrs

Weightage: 40 %

Answer ALL Questions
All Questions carry Equal marks

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1. (a) How do you measure volume changes in a hand that results from the pulsations of blood occurring with each heart beat. Explain.
(b) What is the disadvantage of ac defibrillation. How is it overcome using dc defibrillation. Explain with a circuit and relevant waveforms.

 2. (a) For what measurements can a spirometer be used. Describe the block diagram of an electronic spirometer.
(b) What is biofeedback. How can it be used to control epilepsy. Draw the block diagram of an EEG biofeedback system.

 3. A hospital wishes to connect the ICU, ICCU, Catheterization lab and surgical wards with a telemetry system to monitor patients. Design the entire telemetry system, explaining why you would telemeterize the functions you have selected.

 4. (a) What is Echocardiography. Explain in detail.
(b) Draw the circuit of a system to measure and record basal skin resistance(BSR) and galvanic skin response(GSR).

 5. (a) Discuss various types of ECG recorders.
(b) Design the block diagram of a circuit that will detect QRS complex of the ECG even when the amplitude of the T wave exceeds that of QRS complex.

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TEST2
MEDICAL INSTRUMENTATION -INSTR 481

Date: 12/12/10
Max. Marks: 20

Time: 50mts
Weightage: 20 %

Answer ALL Questions

1. Design the block diagram of synchronous cardiac pacemaker which detects the signals corresponding to the contraction of the atria. (7M)
2. Design a system to measure the skin temperature of human body. Suggest the principle and block diagram. The system should be capable of indicating the temperature in both $^{\circ}\text{F}$ and $^{\circ}\text{C}$. (6M)
3. Design the block diagram of a three channel time division multiplexed radio telemetry system. It should be capable of transmitting the signal ECG, EMG and body temperature. Also give the gain and bandwidth of the amplifiers being used. (7M)

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TEST1

MEDICAL INSTRUMENTATION -INSTR 481

Date: 31/10/10
Max. Marks: 25

Time: 50mts
Weightage: 25 %

Answer ALL Questions

1. Explain EEG with waveforms associated with the different stages of sleep. (5M)
2. Classify the various electrodes to measure bioelectric events. Explain them in detail with figures. (5M)
3. Differentiate between Atrial fibrillation and Ventricular fibrillation. Draw ECG in both cases. Design the block diagram of an instrument to detect atrial fibrillation. (8M)
4. Name the different methods of measuring blood flow. Explain the working of ultrasonic flow meter with a diagram. (7M)

5. Draw the circuit of a dc defibrillator.

6. Draw the Spirogram and mark VC and TLC.

7. Describe the working of ventilator in assist control mode.

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Name:

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BITS, PILANI-DUBAI
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IV Year EIE – I Semester 2010-11
QUIZ 1
MEDICAL INSTRUMENTATION

Date: 4/10/2010

Max. Marks: 8

Time: 20mts

Weightage: 8 %

Answer ALL Questions

1. What are the basic objectives of medical instrumentation system.
2. The effect to convert from thermal to electrical energy is called the _____ ~~effect~~ and ~~Electrical to Thermal~~ is _____ effect.
3. Give any FOUR problems encountered in measuring a living system
4. Name the TWO types of transducers to measure (i) Force (ii) Temperature.

5. Draw the waveform of the action potential clearly showing the different regions.

6. A cell in the resting state is said to be _____ and has a potential ranging from _____.

7. Give the different bands of frequencies in EEG.

8. Show the typical ECG waveform clearly marking all regions.