

BITS PILANI DUBAI CAMPUS
KNOWLEDGE VILLAGE, DUBAI

IV Year EEE&EIE - II Semester 2006-07
COMPREHENSIVE EXAM
MEDICAL INSTRUMENTATION
EEE UC 432/INSTR UC481

Date: 21/5/07
Max. Marks: 50

Time: 3 Hrs
Weightage: 40%

Answer ALL Questions

1. (a) Draw a typical lead II ECG and label all waves and intervals. Explain what is happening with in heart during each wave or interval. (5M)
- (b) The figure 1 shows electromyographic interference on ECG. Suggest a system to separate these two signals. (5M)

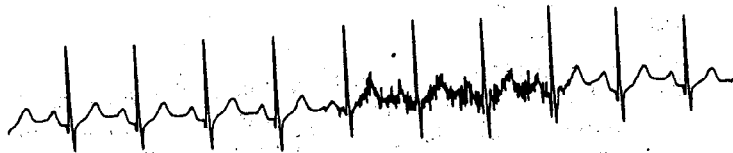


Figure 1

2. (a) Explain the basic operation of the following blood pressure transducers. (5M)
(i) Resistance type transducers (ii) Percutaneous transducer (5M)
- (b) Explain the working of Occulopneumo plethysmograph. (5M)
3. (a) Show the block diagram of a internal pacemaker and explain the same. (5M)
- (b) What are respirators: Explain the different modes of operation. (5M)
4. (a) What are the basic modes of transmission of ultrasound for diagnostic medical applications. Explain. (4M)
- (b) Explain the terms
(i) Afferent and Efferent nerves
(ii) Gray matter and White matter (3M)
- (c) How do you measure and record Basal skin resistance and Galvanic skin resistance. (4M)
5. (a) Suggest a telemetry system for ICU in a hospital. (5M)
- (b) Write short note on:
(i) Neuronal firing measurement
(ii) EEG measurement (5M)

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IV Year EEE&EIE – II Semester 2006-07
Test2 (Open Book)
MEDICAL INSTRUMENTATION

Date: 22/4/07
Max. Marks: 20

Time: 50mts
Weightage: 20%

1. Explain the different problems that are frequently encountered while designing an Electrocardiograph. (5M)

2. Suggest a system that uses one Op amp plus other passive components that will detect QRS complex of the ECG even when the amplitude of the T wave exceeds that of the QRS complex and provides output signals suitable for counting these complexes on a counter. (5M)

3. There is a danger of damage to the myocardium with dc defibrillation. How do you reduce this. (5M)

4. Suggest an instrumentation system for recording pressure, temperature and O₂ in inspired air. Explain. (5M)

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IV Year EEE&EIE – II Semester 2006-07

QUIZ 2

MEDICAL INSTRUMENTATION

EEE UC432/INSTR UC481

Date: 29/3/07
Max. Marks: 10

Time: 30mts
Weightage: 10%

Answer ALL Questions

1. Show the ECG in Lead 2, AVR and V₁.
2. Name the changes in ECG that can occur under pathological conditions.
3. What is the advantage of Vector cardiography.
4. What are the Two methods of locating systolic and Diastolic pressure values.
5. Name Three methods of direct measurement of blood pressure.

6. Name Four methods of measuring blood flow.

7. Show the different waveforms of the magnet current and induce voltage in a magnetic blood flow meter.

8. Draw the block diagram of an ultrasonic blood flow meter.

9. How can vascular obstructions in lower extremities are detected.

10. What does oculo pneumo plethysmograph measure.

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Test1

MEDICAL INSTRUMENTATION

EEE UC 432/INSTR UC481

Date: 4/3/07
Max. Marks: 30

Time: 50mts
Weightage: 20%

Answer ALL Questions

1. Explain the measurement constraints in medical instrumentation. (5M)
2. Name a single transducer which is used in clinical medicine to measure pressure, displacement and force. Explain the characteristics. (5M)
3. Explain EEG during sleep. Show the different waveforms. (5M)
4. What are the problems in using flat surface electrodes. How do you eliminate this problem. (5M)
5. Explain the measurement of Oxygen tension. (5M)
6. Explain the relationship of heart sounds to function of the cardiovascular system. Show the diagram. (5M)

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IV Year EEE&EIE – II Semester 2006-07

QUIZ 1

MEDICAL INSTRUMENTATION

EEE UC432/INSTR UC481

Date: 22/2/07

Max. Marks: 10

Time: 30mts

Weightage: 10%

Answer ALL Questions

1. Name TWO techniques used in imaging systems.
2. Name the stages of biomedical engineering as applied to medical practice.
3. What are the characteristic features looked for when analyzing a bio signals.
4. Conventional microscopes have an accuracy of _____ and commercial automatic systems such as papnet have an accuracy of _____.
5. Name TWO mathematical models for discrete systems.

6. Give any FOUR factors that are to be considered while designing a medical instrumentation system.

7. Name any FOUR problems in measuring a living system.

8. Name any TWO displacement transducers.

9. Show the sketch of Air flow sensor.

10. Cryotherapy refers to _____ temperature.