

BITS, PILANI-DUBAI CAMPUS
DUBAI INTERNATIONAL ACADEMIC CITY
IV Year EIE – I Semester 2011-12
Comprehensive Exam
MEDICAL INSTRUMENTATION –EEE C432/INSTR 481

Date: 7-1-12
Max. Marks: 40

Time: 3 Hrs
Weightage: 40 %

Answer ALL Questions

1. (a) Draw a typical Lead II ECG and label all waves. Explain what is happening electrically within the heart during each wave or interval. Give the normal values for amplitudes and durations of ECG parameters. (4M)
- (b) Describe the setup and working of plethysmography technique of determining the blood flow. (4M)

2. (a) Design the block diagram of a typical central monitoring system for nurses in an ICU. (4M)
- (b) Design an instrumentation system for recording pressure, temperature and percentage of oxygen in inspired air coming from a continuous positive airway. (4M)

3. (a) An impedance pneumograph is based on the fact that the a.c impedance across the chest of a subject changes as respiration occurs. Use this principle and suggest the block diagram of a respiration monitor. (4M)
- (b) Describe the 10-20 system of placement of EEG electrodes. (4M)

4. (a) Explain various techniques and measurements of EMG. (4M)
- (b) Explain a method to measure basal skin resistance (BSR) and galvanic skin resistance (GSR). (4M)

5. Design the block diagram of EEG telemetry system to transfer EEG from the patient's cranium to a remote site without wires. (8M)

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IV Year EIE – I Semester 2011-12
TEST2 (OPEN BOOK)
MEDICAL INSTRUMENTATION –EEE C432/INSTR 481

Date: 4-12-11
Max. Marks: 20

Time: 50mts
Weightage: 20 %

Answer ALL Questions

1. Design the circuit to measure systolic, diastolic and mean blood pressure.
(5M)

2. Design the circuit that uses the same two electrodes plus one ground electrode to monitor ventilation by impedance and the conventional ECG with no cross reference.
(5M)

3. Design an atrial synchronous cardiac pacemaker which detects electric signals corresponding to the contraction of the atria and uses appropriate delays to activate stimulus to the ventricles.
(5M)

4. In an ICU most of the circuits in the bedside monitor are ECG and other related equipment. One of them is a cardio tachometer. Suggest the circuit for a digital type cardio tachometer.
(5M)

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TEST1

MEDICAL INSTRUMENTATION –EEE C432/INSTR 481

Date: 9-10-11
Max. Marks: 25

Time: 50mts
Weightage: 25 %

Answer ALL Questions

1. Discuss the following with reference to a medical instrumentation System:
 - (a) Sensitivity, Isolation (2M)
 - (b) Effect of transducer on measurement , Artifacts (3M)

2. Explain the principle and method of measurement of displacement using inductive transducers. (5M)

3. (a) Explain the various properties desired in a bioelectric amplifier. (2M)
(c) Draw the circuit of basic ECG amplifier giving the various specifications. (3M)

4. Explain the different lead systems to record ECG. (5M)

5. Design the block diagram of an instrument to record ECG and EMG and generate separate outputs. It should have a facility to print the records for patients use. (5M)

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MEDICAL INSTRUMENTATION - INSTR C481

QUIZ -2

DATE: 21.11.11

TIME: 20MTS

MAX MARKS: 7

WEIGHTAGE: 7%

1. Name four methods of measuring blood flow.
2. Explain the principle of magnetic blood flow meter.
3. What are the factors that can cause error in a magnetic blood flow meter.
4. Draw the diagram of a ultrasonic blood flow meter.

5. What are the necessary requirements of an indicator dye that can be used in the blood flow measurement.

6. Give the principle of photoelectric plethysmograph.

7. Patient monitoring equipment is not without its problems or limitations. Give two examples.

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MEDICAL INSTRUMENTATION - INSTR C481

QUIZ 1

DATE: 24.10.11

TIME: 20MTS

MAX MARKS: 8

WEIGHTAGE: 8%

1. Give the following values with reference to ECG waveform.
Amplitudes of P and T waves , Duration of PR Interval, QRS interval.
2. Show ECG waveforms in the following leads: Lead 2, AVR
3. What is Mariott lead.
4. State conditions in ECG that suggest heart block.

5. Show the block diagram of an ECG recorder.

6. Name FOUR types of ECG recorders.

7. What is Mean Arterial pressure.

8. Name FOUR direct measurement techniques to measure blood pressure.