

BITS PILANI DUBAI CAMPUS  
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI  
II Semester 2010-2011  
COMPREHENSIVE EXAMINATION  
MEDICAL INSTRUMENTATION – EEE C432/INSTR C 481

Date: 25-5-2011  
Time: 3 Hrs

Max Marks: 40  
Weightage: 40%

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Answer ALL Questions

1. (a) Explain the various types of ECG recorders. (4M)  
(b) Define cardiac output. How do you measure it. Explain in detail with the setup. (4M)
2. (a) Design a system to measure airway flow to measure total lung capacity and vital capacity. Show the set up and detector design. (4M)  
(b) Explain the construction and working of an electromagnetic blood flow meter. (4M)
3. (a) Design the block diagram of a EEG telemetry system. (4M)  
(b) Design a typical central monitoring nurse station for an ICU. (4M)
4. (a) Explain photo plethysmographic method to measure heart rate. (4M)  
(b) What is Echo cardiography. How does it help in diagnosis. (4M)
5. Design an instrument system to detect QRS complex and generate a pacing pulse from it. (8M)

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TEST 2(OPEN BOOK)

MEDICAL INSTRUMENTATION – INSTR C481/EEE C432

DATE: 8/5/11

MARKS: 20

TIME: 50 Mts

WEIGHTAGE:20%

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Answer All Questions

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1. Design a cardiology department of a small hospital to include facilities for intensive care monitoring, surgery and diagnostics. Specify all the equipment and instrumentation necessary.  
(5M)
2. Impedance pneumogram is based on the fact that a.c impedance across the chest of a subject changes as respiration occurs. Design the block diagram of an impedance pneumograph.  
(5M)
3. Design a typical digital telemetry system to transmit ECG.  
(5M)
4. How does ultrasonic blood pressure measurement system work. Draw the block diagram  
(5M)

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IV Year EIE – II Semester 2010-11  
TEST1

MEDICAL INSTRUMENTATION –EEE C432/INSTR 481

Date: 10/03/11  
Max. Marks: 25

Time: 50mts  
Weightage: 25 %

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Answer ALL Questions  
All Questions carry equal marks

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1. (a) Explain how displacement, velocity and acceleration may be measured simultaneously.  
(b) Draw the waveform of ECG and explain what each wave represents.
2. (a) Draw the equivalent circuit a surface electrodes. How does polarization affect impedance of the electrodes.  
(b) Why and where are needle electrodes used.
3. (a). Draw the waveform of blood pressure on a time base and explain it. What is dicrotic notch.  
(b) Draw the heart sound waveforms in the following cases.  
Normal, Aortic stenosis, Aortic regurgitation.
4. Draw the circuit of an ECG amplifier. Design the same for a gain of 1000.
5. Explain the following in detail:  
Bipolar limb leads, Unipolar limb leads and Chest leads.

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**SECOND SEMESTER 2010- 2011**  
**IV YEAR-- QUIZ 2**

Course Code: EEE C432/INSTR C481  
Course Title: Medical Instrumentation  
Duration: 20 minutes

Date: 11-4-2011  
MaxMarks: 7  
Weightage: 7%

<b>Name:</b> .....	<b>ID No:</b> .....
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1. Name FOUR changes that may occur in the ECG under pathological conditions.
2. Draw the ECG in the following leads: Lead 1, aVR
3. Differentiate between Vector cardiogram and Phono cardiogram.
4. Name FOUR subsystems in an ECG stress test system.

5. What are the FOUR methods of direct measurement of blood pressure.

6. Name FOUR methods of measuring blood flow.

7. What is the difference between Impedance plethysmography and capacitance plethysmography.

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**BITS PILANI, DUBAI CAMPUS**  
**SECOND SEMESTER 2010- 2011**  
**IV YEAR-- QUIZ 1**

Course Code: EEE C432/INSTR C481  
Course Title: Medical Instrumentation  
Duration: 20 minutes

Date: 7-3-2011  
MaxMarks: 8  
Weightage: 8%

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

1. Name the factors that add to difficulty of obtaining valid measurements in a human subject.
2. Name the components of the Man – Instrument system.
3. What is piezoelectric effect? Is this reversible.
4. Name the transducers to measure the following: Velocity, Force, temperature, Light intensity

5. Draw the setup to measure force using a differential transducer.

6. Explain the buildup of resting potential.

7. Name the EEG frequency bands or rhythms.

8. Differentiate between Electro retinogram and Electro oculogram.