

BITS, PILANI-DUBAI  
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI  
Comprehensive Examination  
TRANSDUCERS & MEASUREMENT SYSTEMS  
INSTR C381

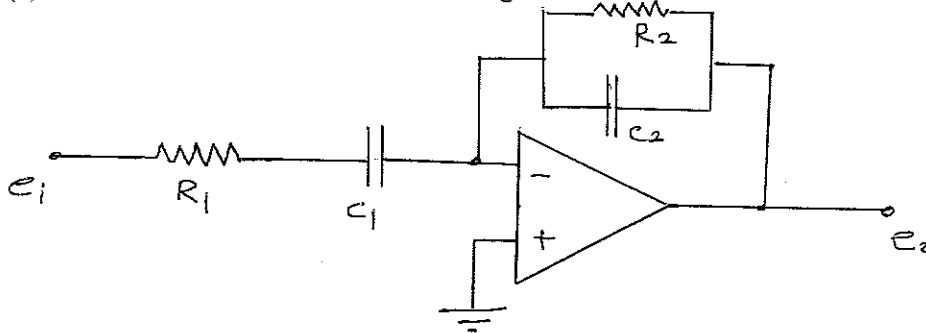
Date: 28-12-2010  
Time: 3 Hrs

Max Marks: 40  
Weightage: 40%

Answer all questions  
All questions carry equal marks

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1. (a) Describe a method to measure pressure using optical methods. Show the set up.  
(b) Explain the construction and working of a thermocouple gage with a diagram.
2. (a) Explain in detail a method where speed measurement allows flow rate measurement.  
(b) How do you use RTD in the construction of a resistance thermometer. Explain.
3. (a) How do you measure liquid level of a conductive liquid stored in a tank. Draw the figure and explain.  
(b) Draw the circuit of an Instrumentation amplifier and design the same for a gain of 500.
4. (a) Derive the transfer function of the given circuit.



- (b) Explain the various cable or transmission line models and their frequency response.
5. Design the block diagram of a three channel radio telemetry system capable of transmitting signal from three sensors sensing Temperature, velocity and pressure.

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TEST2 (Open Book)  
TRANSDUCERS & MEASUREMENT SYSTEMS  
INSTR C381

Date: 11-12-2010  
Time: 50 Mts

Max Marks: 20  
Weightage: 20%

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Answer all questions

1. Measurement of flare gas velocity in refineries is a common application of flow measurement. Suggest a suitable technique to measure the velocity. The transducer should not be in direct contact with the medium under measurement. Design a suitable block diagram for the measurement.  
(7M)
  
2. Design the block diagram to measure human body temperature. The meter should have a digital display with a choice to display the temperature in  $^{\circ}\text{F}$  and  $^{\circ}\text{C}$ .  
(6M)
  
3. Design the block diagram of a single instrument which has a provision for two inputs. The inputs to the instrument are a sine wave and a pulse. The instrument should be capable of measuring (i) frequency and time period of a given sine signal (ii) pulse width of a given pulse.  
(7M)

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TEST1 (Closed Book)  
TRANSDUCERS & MEASUREMENT SYSTEMS  
INSTR C355

Date: 24-10-2010

Time: 50 Mts

Max Marks: 25

Weightage: 25%

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Answer all questions

Attach the semi log sheet to the answer book

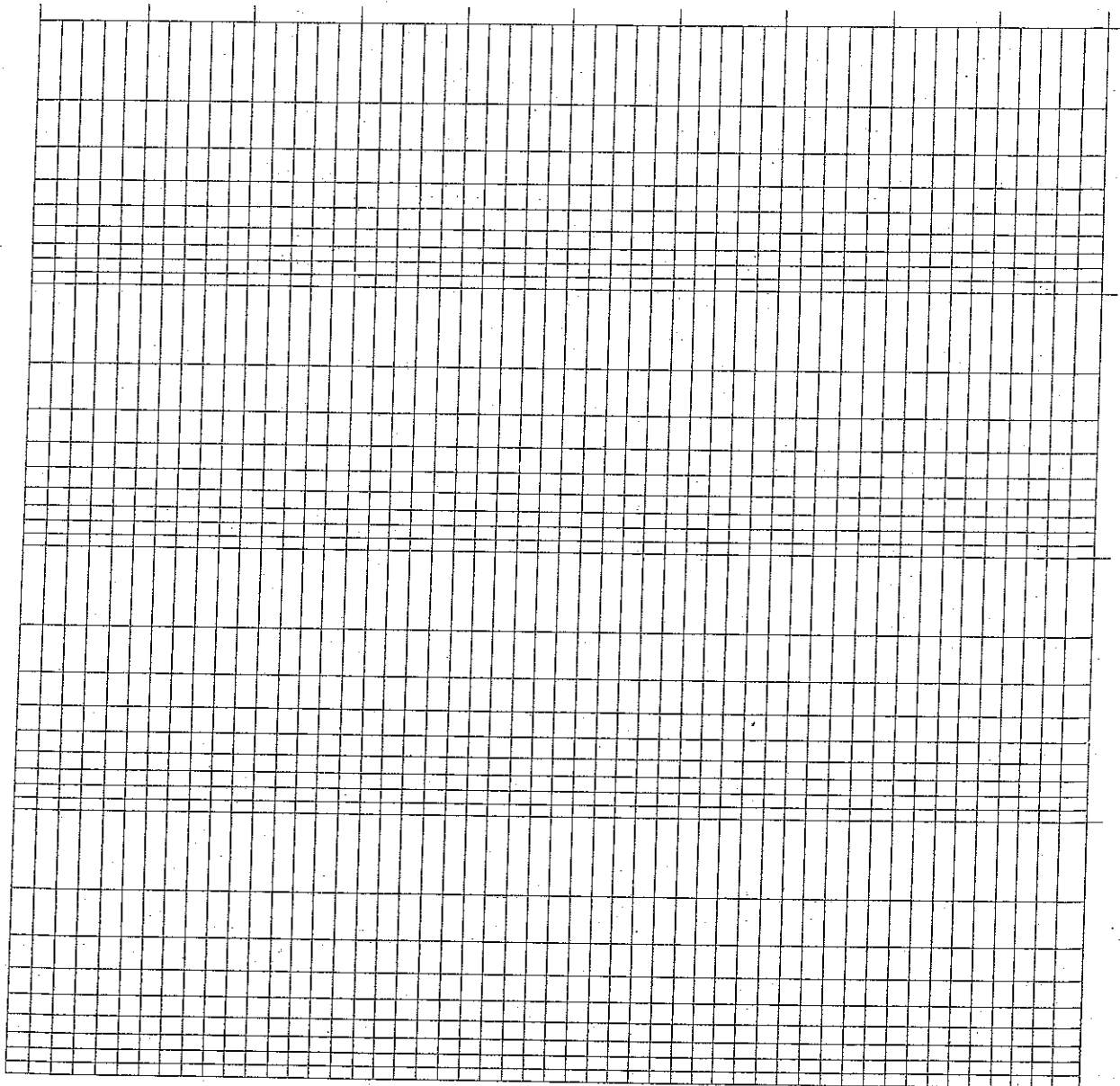
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1. (a) Give three features of Theoretical methods and Experimental methods. (2M)  
(b) How is the input quantities classified. Explain. (3M)

2. Draw the frequency response for the transfer function

$$G(s) = \frac{10s}{(s+1)(s+10)} \quad (8M)$$

3. Explain how 50Hz noise can be rejected through amplitude modulation when amplifying sensor signals. (5M)
4. Small translational motion in the range of 20 to 100  $\mu\text{m}$  is difficult to measure. Explain the sensor and setup to measure such small distances. (7M)



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Name:

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BITS, PILANI-DUBAI  
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QUIZ 2  
TRANSDUCERS & MEASUREMENT SYSTEMS- INSTR C381

Date: 9/12/2010

Max Marks: 7

Time: 20 Mts

Weightage: 7%

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Answer all questions

1. How do you increase the sensitivity of pressure measurement in a well type manometer.  
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2. Name three types of elastic transducers and draw the figure of one in each category.
3. How is Torr defines. Give the relation between mBar, Torr and psi.

4. Give the range of pressures measured by the following gages. McLeod gage, Knudson gage, Momentum transfer gage and Thermal conductivity gage.

5. Give the principle of Ionization gages.

6. Define sound pressure level.

7. Draw the block diagram of a sound level meter.

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BITS, PILANI-DUBAI  
DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI  
QUIZ1  
TRANSDUCERS & MEASUREMENT SYSTEMS- INSTR C355

Date: 24/11/2010

Time: 20 Mts

Max Marks: 8

Weightage: 8%

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Answer all questions

1. Name any FOUR basic methods of force measurement.
2. Give the relationship between input force and output displacement.
3. High stiffness in load cell implies less sensitivity. How do you increase the sensitivity.

4. LVDT load cells are available in the ranges from \_\_\_\_\_ grams to \_\_\_\_\_ k grams.
5. Forces in the ranges of 1000N tension to 5000N compression can be measured by \_\_\_\_\_ load cells.
6. Draw the block diagram of digital force measurement.
7. How is Torque measurement accomplished.
8. How do you measure small torques.