

BITS PILANI – DUBAI
International Academic City, Dubai
First Semester 2010 – 2011
Measurement Techniques-II TAC222
Test-2 (Closed Book)

Duration : 50minutes
Max Marks : 45Marks

No of pages: 1

Weightage : 15%
Date: 12.12.10

1. A certain thermometer has a time constant of 15s and an initial temperature of 20 degrees C. It is suddenly exposed to a temperature of 100 degrees C. Determine the rise time and the temperature at this time. 12M

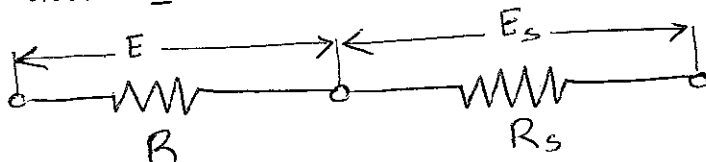
2. Define the following

1. Readability
2. Least Count
3. Sensitivity

6M

3. Two resistors R and R_s are connected in series as shown in the figure, the voltage drops across each resistor are measured as

$E = 10V \pm 0.1V$ (1%)
 $E_s = 1.2V \pm 0.005V$ (0.467%)
Along with a value of
 $R_s = 0.0066 \Omega \pm \frac{1}{4} \%$.



From these measurements, determine the power dissipated in resistor R and its uncertainty. 10M

4. Explain the principle of Capacitive Transducers with neat sketch. Mention the applications of it. 12M

5. A Quartz piezoelectric crystal having a thickness of 2 mm is subjected to a pressure of $1.38 \times 10^6 \text{ N/m}^2$, and voltage output is 151.8 V, Calculate the voltage sensitivity 5M

BITS, Pilani –Dubai
Dubai International Academic City, Dubai, U.A.E
II Year I Semester 2010-2011 [NON-EEE]

Test No.1 (Closed Book)

Course No. TA C222 Course Title: Measurement Techniques-11 Weightage: 15 %

Date: 31-10-2010

Max.Marks: 45

Duration: 50 min.

(i) Answer all the questions (ii) Answer Part A and Part B in the same answer sheet

- Make suitable assumptions if required and clearly state them
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Part A (5x3=15 Marks)

1. What do you mean by Flow obstruction Meter? Give an example with neat sketch.
2. Compare RTDs and Thermistors.
3. Briefly explain the Bimetallic strip thermometer with a simple sketch.
4. Distinguish Gauge pressure, Absolute pressure and Vacuum pressure with a diagram.
5. Explain how thermal conductivity of an unknown material can be measured.

Part B (3x10=30 Marks)

6. Water flows at the rate of $0.015 \text{ m}^3/\text{s}$ through a 100 mm diameter orifice used in a 200 mm pipe. What is the difference in pressure head between the upstream section and vena contracta section? Assume $C_d=0.6$
7. A platinum resistance thermometer is used to measure the temperature by measuring the resistance change in the platinum wire with temperature change. The resistance of the wire is given by $R=R_0 [1+ \alpha(T-T_0)]$ Where $R_0= 6 \text{ ohm} \pm 0.3 \%$ is the resistance at reference temperature $T_0 =20 \text{ }^\circ\text{C}$, $\alpha = 0.00394 \text{ }^\circ\text{C}^{-1} \pm 1\%$ is the temperature coefficient of resistance and the temperature of the wire is $T= 30 \pm 1^\circ\text{C}$. Calculate the resistance of the wire, its sensitivity in ohms per degrees and the uncertainty in resistance value.
8. The velocity distribution of a viscous fluid $\mu = 0.85 \text{ Ns/m}^2$ flowing over a fixed plate is given by $u=0.75y-y^2$. u - velocity and y is the distance from the plate. Determine the shear stresses at the surface and at a distance of 0.25m.
