BITS, PILANI – DUBAI, INTERNATIONAL ACADEMIC CITY, DUBAI
SECOND SEMESTER 2009 – 2010
TA C222 MEASUREMENT TECHNIQUES – II
TEST2 EEE (CLOSED BOOK)

MAXIMUM MARKS: 45 WEIGHTAGE: 15%
DATE: 18.04.10 DURATION: 50 MINUTES

1. A certain thermometer has a time constant of 20s and an initial temperature of 35°C. It is suddenly exposed to a temperature of 120°C. Determine the rise time i.e. time to attain 90% of the study state value, and temperature at this time. **[9 Marks]**

2. The resistance of a certain copper wire is given as

$$R = R_0[1 + \alpha(T - 25)]$$

where $R_0 = 5.5\Omega \pm 0.4$ percent is the resistance at 25°C, $\alpha = 0.003°C^{-1} \pm 1$ percent is the temperature coefficient of resistance, and the temperature of the wire is $T = 32 \pm 1°C$. Calculate the resistance of the wire and its uncertainty. **[9 Marks]**

3. Consider the two resistors R_1 and R_2 with values as: $R_1 = 100.0 \pm 0.1\ \Omega$ and $R_2 = 50.0 \pm 0.03\ \Omega$ respectively. Calculate the uncertainty in the measurement of their combined resistance if they are connected in (a) a series arrangement and (b) a parallel arrangement. **[9 Marks]**

4. Explain the following with respect to the working of a moving-iron instrument **[9 Marks]**

4A) Draw a neat diagram
4B) Principle of operation
4C) Factors contributing to accuracy fluctuation
4D) Meter deflection and scale

5. Explain the following terms with reference to the working of LVDT.
5A) Draw the V-graph
5B) sensitivity
5C) linearity
5D) null voltage **[3+2+2+2 Marks]**

BITS, PILANI – DUBAI
II Semester 2009 – 2010

Test I (Closed book)

Course No & Title : TA C222 Measurement Techniques II (Non EEE)

Date : 07/03/2010
Time : 50 minutes

Max: 30 Marks
Weightage: 15%

- Answer all the questions
- Assume suitable data, if required

1 a Explain the working principle of quarter bridge circuit strain gauge system with suitable diagram. [3]

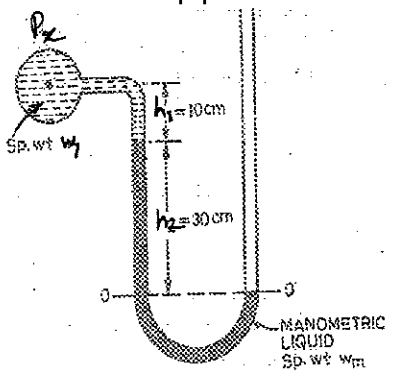
b The strain data obtained from a rectangular rosette arrangement is given below.
ε_A= 400μm/m, ε_B =300 μm/m, ε_C = -100 μm/m [5]
Determine the principal strains and orientation of principal plane.

2 a With a simple sketch explain the working of a bourdon gauge for pressure measurement. [3]

b A closed tank has an orifice 0.03mm in one of its vertical sides. The tank has oil to a height of 0.6m above the axis of the orifice and the pressure in the space above the oil is 14000Pa. Determine the discharge from the orifice taking Cd as 0.6 and relative density of oil as 0.91. [5]

3 a Explain the working principle of pitot tube with a simple sketch. [3]

b The right limb of a simple U-tube manometer containing mercury is open to atmosphere and the left limb is connected to a pipe through which flows a fluid of specific gravity 0.8. Calculate the pressure in the pipe if the difference of mercury level in the two limbs is 30 cm and the level of fluid in the left limb is 10 cm below the centre of pipe. [5]



4.a Briefly explain the working principle of a torque measurement system. [3]

b Compare the characteristics of different flow meters. [3]