I.D NO:-_____

BITS, PILANI-DUBAI, INTERNATIONAL ACADEMIC CITY,DUBAI
FIRST SEMESTER 2008-2009
TEST-1

Course Name: Measurement Techniques II (Non EEE)
Course No. : TA C222
Nature of Component: Closed Book

Date: 02-11-08
MAX MARKS: 20
WEIGHTAGE: 10%
Duration: 50 Minutes

NOTE: i) Write your ID Number on the top immediately on the receipt of this paper.
ii) Attempt all the questions.
iii) If any data is missing, assume suitable value.

1.a) What are the metals used in Resistance Temperature Detectors and Thermocouple temperature measurement devices. **[1 Marks]**

b) The energy emitted from a piece of metal is measured and the temperature is determined to be 1050^0 C, assuming a surface emissivity of 0.82. It is later found that the true emissivity is 0.75. Calculate the error in the temperature determination. **[4Marks]**

2.a) Mention how the capacitor is used to measure pressure with a diaphragm gauge. **[1 Marks]**

b) A well type manometer has the measurement leg inclined at 30deg. from the horizontal. The diameter of the measurement column is 5mm and the diameter of the well is 5cm. An oil having a specific gravity of 0.85 is used as a fluid. A differential pressure in air at 1 atmosphere and 20deg.C is made which produces a displacement in the measurement column of 15cm from the zero level. What is the differential pressure in Pascal? **[4 Marks]**

3. a) Define the term *Vena contracta* & show it on orifice meter. **[1 Marks]**

b) A Rotameter is calibrated for metering a liquid of density 1000Kg/m3 & has a scale ranging from 1 to 1000 l/min. It is intended to use this meter for metering the flow of gas of density 1.25 Kg/m3 with a flow range between 20 and 2000 l/min. Determine the density of the new float, if the original one has a density of 2000 kg/m3.The shape and volume of both floats is assumed to be the same. **[4 Marks]**

4.a) Why a Half bridge is preferred over Quarter Bridge in the case of strain measurement? **[1 Marks]**

b) Define the strain sensitivity (S_a) & Derive it for wire of length L ,cross-sectional Area A, resistivity ρ , electrical resistance R , Poisson's ratio ν & the axial strain ε :

$$S_a = 1 + 2\nu + \frac{d\rho / \rho}{\varepsilon}$$

Also differentiate between strain sensitivity & gauge factor. **[4 Marks]**

END

BITS,PILANI- DUBAI

Dubai International Academic City, Dubai

Year II – Semester I 2008 – 2009

TEST II (Closed Book)

Course No: TA C 222

Course Title: MEASUREMENT TECHNIQUES II

Date:21.12.06 Time: 50 Minutes M.M = 20(10%)

ANSWER ALL THE QUESTIONS

1. (a) A first order system has a phase shift of -50° at a certain frequency. What will be the phase lag at a frequency of twice of this value? What will be the relative amplitude responses at the two frequencies?

   (b) A thermometer acting as a first order system is initially at a temperature of 35° C and is then suddenly subjected to a temperature of 110° C. After 8sec the thermometer indicates a temperature of 75° C. Calculate the time constant and the 90 percent rise time for the thermometer.

   [4 + 3 Marks]

2. (a) Explain the principle of capacitor transducers with neat sketch. What are the applications of it?

   (b) Draw the circuit diagram for LVDT transducer [3 Marks]

   (c) Moving coil meters are used to measure _____ power supply [2 Marks] [1 Mark]

3. (a) Write the definitions for the following

   (i) Readability

   (ii) Sensitivity

   (iii) Least count

   (b) A resistance arrangement of **50Ω** is desired. Two resistances of **100.0 ± 0.1Ω** and two resistances of **25.0 ± 0.02Ω** are available. Which should be used, a series arrangement with the **25-Ω** resistors or a parallel arrangement with the **100-Ω** resistors? Calculate the uncertainty for each arrangement. [3 Marks]

   [4 Marks]

BITS,Pilani-Dubai

First Semester 2008-09

TA C 222 MEASUREMENT TECHNIQUES II (Non- EEE)

Quiz 1

Weightage 5%

Max marks 10

Name:---------- **ID No.**----------

Note:

1. Put across the correct answer for multiple choice questions
2. Do not scribe or overwrite

---

1. Bernoulli's principle is used to calculate discharge in
   a) orifice meter b) pitot tube c) venturimeter d) all of the above
2. What is mean by stagnation point?

3. Define the term static pressure ----------

4. What type of pressure is sensed in circumferential holes of pitot tube.

5. . What is no-slip condition?
6. _____ is the cross sectional shape of bourdon tube in pressure gage.

   a) Circular b) hexagonal c) elliptical d) none of the above

7. Definition for Coefficient of discharge is----------

8. The pressure gauge sensing pressure under the sea level reads 1.4 MPa. How deep is the instrument if the specific gravity is 1.025

9. In your experiment on air flow through orifice meter, when Re < 2000, the flow of air can be considered as
   a) Unsteady b) turbulent c) transient d) none of the above

10. In your gas rotameter calibration experiment, the air velocity is measured by
    a)piezameter b) pitot tube c) anemometer d)none of the above

BITS, PILANI-DUBAI, INTERNATIONAL ACADEMIC CITY,DUBAI
FIRST SEMESTER 2008-2009
TAUC 222 Measurement Techniques- II (QUIZ-I)

MAX MARKS: 15 DURATION: 15 MINUTES WEIGHTAGE: 5%

NAME OF STUDENT: _____ I.D:_____

NOTES: i) Change of answer & overwriting is not permitted.
ii) If any one found in signal nodding or any form of cheating, his copy will be marked by # and then forwarded to discipline committee for further action.

Q.1 Name the instrument available in the lab to which Coefficient discharge is applicable _____.

Q.2 while measuring the volume flow rate of water in the liquid Rota meter tests the discharge rate of pump is _____.

Q.3 Rota meter is essentially installed in _____ pipeline.

Q.4 one atmospheric pressure is equivalent to _____mm of water column.

Q.5 In pitot tube the differential pressure indicated by manometer is_____.

Q.6 The density of Rota meter bob material is _____the density of fluid.

Q.7 Digital planimeter is effectively used to measure _____.

Q.8 which liquid can not be used as manometric fluid? _____

Q.9 Reynolds Experiment is conducted at _____ head.

Q10. In your experiment to find the heat transfer coefficient, the thermal conductivity you use is for _____.

Q.11 In transient heat conduction the rate of heat transfer is dependent of_____.

Q12. In your orifice meter experiment, the flows are laminar or turbulent? _____.

Q.13 Anemometer is used to measure _____.

Q.14 Bernoulli's theorem is applicable only for _____ flow.

Q.15 In Bernoulli's theorem experiment the flow rate is measured by _____.

BITS, PILANI-DUBAI, INTERNATIONAL ACADEMIC CITY,DUBAI
FIRST SEMESTER 2008-2009
TAUC 222 Measurement Techniques- II (QUIZ-II)

MAX MARKS: 5 DURATION: 15 MINUTES WEIGHTAGE: 5%

NAME OF STUDENT: _____ I.D:_____

NOTES: i) Change of answer & overwriting is not permitted.
ii) If any one found in signal nodding or any form of cheating, his copy will be marked by # and then forwarded to discipline committee for further action.

1. The velocity of fluid at a point in a pipe can be measured using ----------(1/2)
2. The SI unit for kinematic viscosity is ----------(1/2)
3. The range for Reynolds number for laminar flow is ----------(1/2)
4. The equipment used for measuring elevation height is ---------- (1/2)
5. Differentiate a tilting level and a theodolite (1)
6. Manometer reading (h1-h2) = 197 $X10^{-3}$ m, Density of manometer liquid = 1000 Kg/m^3 and Density of air = 1.205 Kg/m^3 . Determine the differential pressure head in m of air. (1)
7. If Pcal, abs = 25730 mmWC and Pact,abs = 87805 mm WC, Determine the correction factor in rotameter (1)

BITS,Pilani-Dubai

First Semester 2008-09

TA C 222 MEASUREMENT TECHNIQUES II (Non- EEE)

Quiz 2

Weightage 5%

Max marks 10

Name:---------- **ID No.**----------

Note:

1. Put across the correct answer for multiple choice questions
2. Do not scribe or overwrite

---

1. Name the main components in rotometer device.

2. Bernoulli's principle is used to calculate discharge in
a) orifice meter b) pitot tube c) venturimeter d) all of the above

3. what is the relation ship between kinematic and dynamic viscousity?

4. Digital palanimeter is effectively used to measure
a) 2-dimentional regular areas b) 2-dimentional irregular areas c) surface areas of 3-dimentional objects d) none of the above

5. Why do you include velocity coefficient to calculate the flow rate using pitot tube?

6. In your experiment to find convective heat transfer coefficient, the heat transfer principle used is related to
a) Steady state heat transfer b) convection heat transfer c) radiation heat transfer d) none of the above

7. What type of pressure is sensed in circumferential holes of pitot tube.

8. Shear stress is more ----------a)in laminar flow or b)turbulent flow.

9. State and write the Bernoulli's theorem.

10. One atmospheric pressure = ----------Pascal