

BITS,PILANI- DUBAI
Dubai International Academic City, Dubai
Year II – Semester I 2009 – 2010
TEST II (Closed Book)

Course No: TA C 222

Course Title: MEASUREMENT TECHNIQUES II

Date: 20.12.09

Time: 50 Minutes

Marks= 30(15%)

ANSWER ALL THE QUESTIONS

1. (a) 100V is the exact reading that is to be measured. 10 measurements were made and the measured values were tabulated.

| Measurement no. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|-----------------|----|------|-------|----|-------|------|------|-------|-------|-------|
| Measured Value | 95 | 95.1 | 95.06 | 95 | 95.03 | 94.9 | 94.8 | 95.01 | 95.06 | 94.99 |

Comment on the Precision and Accuracy of the instrument. What is the percentage of Accuracy? [6Marks]

- (b). A load test was conducted in Dc motor. The name plate details of the machine are as follows.

Speed: 1500 RPM, Full load current: 5 A, Voltage: 200 V. With increase in load, the load current was increased by 2 A, correspondingly the change in deflection of the pointer in the measuring instrument is 1 cm. What is the sensitivity of the instrument? [2Marks]

2. (a) Explain the principle of capacitor transducers with neat sketch. What are the applications of it? [5Marks]

(b) Draw the circuit diagram for LVDT transducer [2 Marks]

3. (a) Write the definitions for the following

- (i) Readability
- (ii) Sensitivity
- (iii) Least count
- (iv) Calibration [8 Marks]

(b) Moving coil meters are used to measure -----power supply [1 Mark]

- 4) Two resistances R1 and R2 are connected in series and parallel. The value of the resistance are $R1= 100.0 \pm 0.1$ ohm and $R2= 50.0 \pm 0.03$ ohm. Calculate the uncertainty in the combined resistance for both series and parallel arrangement [6 marks]

BITS, PILANI – DUBAI
First Semester 2009-2010

II Year

TA C222 Measurement Techniques II

Date: 08-11-09

Time: 50 min.

Test 1

Weightage: 15%

Marks: 30

| # | Answer all the questions Assume suitable data, if required | Marks |
|---|---|-----------------------|
| 1 | <p>a. State the Newton's law of viscosity. Give the units for dynamic and kinematic viscosity.</p> <p>b. A vertical cylinder of 0.05m diameter is mounted concentrically in a drum of diameter 0.052m. Oil fills the space between them to a depth of 0.3m. The torque required to rotate the cylinder is 5N-m when rotating at 8 rev/sec. Calculate the viscosity of the oil.</p> | <p>[2]</p> <p>[5]</p> |
| 2 | <p>a. Differentiate between atmospheric, gauge and absolute pressures. Give expression for absolute pressure in terms of gauge and atmospheric pressures for both positive and vacuum pressure measurements.</p> <p>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. Make calculations for the vacuum pressure in the pipe if the difference of mercury level in the two limbs is 30cm and the level of fluid in the left limb is 10cm below the centre of the pipe. If the atmospheric pressure is 101.325 kN/m² give the absolute pressure of the fluid in the pipe line.</p> | <p>[3]</p> <p>[5]</p> |
| 3 | <p>a. What is Vena Contracta? Give its significance.</p> <p>b. A Venturimeter with diameter of 200 mm at inlet & 100 mm throat laid with axis horizontal, and is used for measuring the flow of oil having specific gravity 0.8. The difference of levels in the U-tube differential manometer reads 180 mm of mercury whilst 11520 kg of oil is collected in 4 minutes. Calculate the discharge coefficient for the Venturimeter. Take the specific gravity of the mercury as 13.6.</p> | <p>[2]</p> <p>[5]</p> |
| 4 | <p>a. Compare the performance characteristics of thermocouples and RTDs.</p> <p>b. A radiant energy measurement is made to determine the temperature of a hot block of metal. The emitted energy from the surface of the metal is measured as $28 \pm 0.4 \text{ kW/m}^2$ and the surface emissivity is estimated as 0.90 ± 0.05. Calculate the surface temperature of the metal and estimate the uncertainty. [$\sigma = 5.669 \times 10^{-8} \text{ W/m}^2 \cdot \text{K}^4$]</p> | <p>[3]</p> <p>[5]</p> |