Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 151701 **Date: 02/06/2012**

Subject Name: Industrial Measurement

Time: 02:30 pm – 05:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Given the unique merit and demerit of J, K, R type thermocouple. Also given the range, metals(positive and negative) use in J, K, R type thermocouple. **07**

(b) What is PT-100 RTD? Why platinum is mostly preferred as metal of RTD? Explain the RTD lead wire configuration use in industries to minimize the lead error with net sketch and necessary equation. **07**

Q.2 **(a)** Answer the following. **07**

1. Why mercury is preferred as manometer liquid?
2. What is seeback and peltier effect?
3. Givens the units of temperature. Given the equation for ^{O}C to ^{O}F conversation. Find out the point at which ^{O}C and ^{O}F being same.

(b) A venturi tube of throat diameter 60 mm is used in a water pipe of diameter 100 mm to measure the volumetric flow. The flow rate through the tube is 0.08 m^3/s and the water has a density of 10^3 kg/m^3 and viscosity of 10^{-3} Ns/m^2. **07**

- Determine the reynold's number for these conditions.
- The co-efficient of discharge is 0.99, determine the upstream to throat differential pressure.

OR

(b) A flat circular diaphragm of mild steel has a diameter of 15 mm. For mild steel, Young's module of 200 GN/m^2 and Poisson's ratio of 0.28. **07**

- Find the thickness of the diaphragm if the maximum stress is not exceed 300 MN/m^2 when the applied pressure is 300 KN/m^2.
- Find the deflection at the Centre for a pressure 150 KN/m^2.

Q.3 **(a)** Given the comparison of Thermistor, RTD and Thermocouple. **07**

(b) Define the vacuum pressure. Explain pirani vacuum gauge with all details. **07**

OR

Q.3 **(a)** What you mean by ambient temperature compensation in temperature measurement by Thermocouple? Explain the ice bath method with all details. **07**

(b) Given only application of float, displacer and torque tube for level measurement. Also given the problem we face in sight glass level measurement method and how we can minimize them. **07**

Q.4 **(a)** List out various elastic primary transducer use for pressure measurement. Explain pressure switch with details of how elastic primary transducer use **07**

in it.

(b) Why air purge system become popular in industries for level measurement? Explain air bubbler system with principle, operation and operation consideration. **07**

OR

Q.4 **(a)** Explain the principle and type of manometer with net sketch. Also explain how we measure gauge pressure and differential pressure by manometer. **07**

(b) Explain DP (Differential Pressure Transmitter) method for open and close tank level measurement. How we done location correction for hydrostatic pressure for DP transmitter, explain with net sketch. **07**

Q.5 **(a)** Explain the following concept regarding flow measurement. **07**

1. Reynold Number
2. Discharge flow coefficient
3. Type of Flow
4. β ratio

(b) Give the reason why mass flow meters are preferred in refinery industries for flow measurement. Also given the comparison of volumetric flow meters v/s mass flow meters. **07**

OR

Q.5 **(a)** Explain principle of operation, orifice plate selection and designing of orifice flow meter. **07**

(b) Explain the principle, operation and application of Doppler flow ultrasonic flow meter **07**

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