Printed Pages: 4 **NIC-602**

(Following Paper ID and Roll No. to be filled in your Answer Books)	
Paper ID : 122612	**Roll No.**

B.TECH

Theory Examination (Semester-VI) 2015-16

INDUSTRIAL INSTRUMENTATION

Time : 3 Hours ***Max. Marks : 100***

Section-A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in sort. (2×10 = 20)

(a) What is probe analyser?

(b) What is meant by calibration process in instrumentation?

(c) Draw the arrangement to show how LVDT can be used with bourdon tube for the pressure measurement.

(d) Explain Piezoelectric Transducer with mathematical formula of charge sensitivity and voltage Sensitivity.

(e) What is Actuator? Give application of actuators.

(f) Give the comparative analysis of RTD, Thermocouple and Thermistor.

(g) Why cold junction compensation is required for thermocouple?

(h) What is stagnation pressure? Write the expression of velocity of flow using Pitot tube.

(i) Give the classification of flow-meter.

(j) Define Dynamic viscosity and Kinamatic viscosity.

Section-B

2. Attempt any five questions from this section. (10×5 = 50)

(a) What is load cell? Derive guage factor for wire wounded strain gauge. Give the application of strain gauge.

(b) What is piezoelectric effect? Describe different modes of operation of piezoelectric transducer with appropriate diagram. List the name of four piezoelectric materials.

(c) Draw and explain the resistance temp characteristics of conductor and semiconductor. For a certain thermistor β = 3140K and the resistance at 27°C is known as to be 1050Ω. The thermistor is used for temp. measurement and the resistance measured is as 2330Ω. Find measured temp.

(d) What is concept of Radiation Pyrometer? Explain working principle of disappearing filament type optical pyrometer.

(e) Enlist different methods of measurement of low pressure. Explain the working of McLoed Gauge.

A U-tube manometer is used to measure a differential air pressure with a fluid of density 450Kg/m. The air is at 250kPa and 25ºC. Calculate the differential pressure if the difference in the height of the fluid in the manometer is 100mm. Express in units of kPa.

(f) Describe the construction and working principle of Rota-meter. Derive the expression for volume flow rate. Also explain its merits and demerits.

(g) Describes any two methods for level measurement with neat and clean diagram :

(i) Gamma ray method

(ii) Capacitive method

(iii) Ultrasonic method

(h) Discuss electrical method for moisture measurement. Explain its advantages.

Section-C

Note : Attempt any two questions in this section. (15×2 = 30)

3. Describe the construction and working principles of venturimeter and derive the expression for actual flow rate for incompresssible fluid.

A venturimeter is used to measure the volume flow rate of an oil having a density of 850 kg/m^3. It is fitted in a vertical pipe line with oil flowing downwards. Its diameters at the inlet and throat are 0.3 m and 0.2m respectively. The pressures at the inlet and throat are measured by pressure transducer and found to be 1.8 × 105 Pa and 1.4 × 105 Pa respectively. The difference in height between the inlet and throat is 0.5m. The discharge coefficient of the venture tube is 0.95. Determine the volume flow rate of the oil.

4. What is the construction and working principle of thermocouple for the temperature measurement? Explain Reference junction compensation in thermocouple in brief.

A chromel - Alumel thermocouple is assumed to merely operating range up to 1100ºC with emf (Ref 0ºC) 45.14 mV at this temp. The potentiometer is used as cold junction and its temp is estimated to 25ºC. Calculate the emf indicated on potentiometer.

5. Illustraste about the following terms :

(a) Saybolt viscometer

(b) Capacitivie method for level measurement

(c) Distillation method for moisture measurements