UG/Sem-V/UIE503 (Backlog)

2024

INDUSTRIAL INSTRUMENTATION

Full Marks: 100

Time: Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

Symbols have their usual significances.

1	a)	Define the terms: Absolute pressure, Gauge pressure and Vacuum.	6
		Convert (i) 50 kPa into Bar and (ii) 25.6 Torr into Pascal.	4
	b)	Explain, with the schematic diagram, the principle of operation of well type manometer.	6
	c)	The pressure in ionization gauge chamber is 2.5 x 10^{-5}Torr for a plate current of 7.2 x 10^{-6}A. What should be the grid current to have a sensitivity of 100/Torr?	4
2	a)	Write down the R - T relationships and temperature range of thermistor. Draw its characteristic. Mention its advantages and disadvantages.	6
	b)	Determine A for a thermistor having β = 4200K and resistance 25 kΩ at 25^0C. Calculate the value of temperature coefficient of resistance (TCR) of thermistor at 0^0C and 50^0C.	6
	c)	What you mean by cold junction compensation (CJC) of a thermocouple?	3
		Explain, with circuit diagram, the bridge method for cold junction compensation.	5
3	a)	Define Raynold number. How Raynold number is related to the laminar and turbulent flow pattern?	4
	b)	Starting from Bernoulli's theorem, derive the volume flow rate for orifice meter.	10
		Draw the pressure variation curve for orifice meter.	2
	c)	What are the different types of tapping in orifice plate flow meter?	4
4		Explain, with the schematic diagram, the principle of operation of (i) turbine flow meter, and (ii) Doppler shift ultrasonic flow meter. Mention their advantages and disadvantages.	8+8

5 Explain, with the schematic diagram, the principle of operation of (i) bubbler method and (ii) nucleonic level gauge for liquid level measurement. 8+8

Mention their advantages and disadvantages. 4

6 Explain, with the schematic diagram, the principle of operation of flapper-nozzle system. 10

Explain how a flappe-nozzle system can be used to develop a current to pressure converter. 10

7 Write short notes on any two of the following 10x2=20

a) Electromagnetic flow meter

b) Cold cathode ionization gauge

c) Pressure to current converter

d) Pirani gauge