Question Paper Code	12676

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Fourth Semester

Instrumentation and Control Engineering

(Common to Electronics and Instrumentation Engineering)

20ICPC402 - INDUSTRIAL INSTRUMENTATION

Regulations - 2020

Duration: 3 Hours   Max. Marks: 100

PART - A (10 × 2 = 20 Marks)
Answer ALL Questions

		Marks	K-Level	CO
1.	List out few examples of Hygroscopic material.	2	K1	CO1
2.	Define Kinematic Viscosity.	2	K1	CO1
3.	Mention the sources of error in filled-in system thermometer.	2	K1	CO2
4.	Differentiate a capsule from Diaphragm.	2	K2	CO2
5.	Define the term 'vena contracta'.	2	K1	CO3
6.	List the types of flow meters based on positive displacement principles.	2	K1	CO3
7.	State the mathematical equation that characterizes the frequency of Vortex shedding in a Vortex Flow meter.	2	K2	CO4
8.	Identify the diverse excitation techniques applied to electromagnetic flow meters.	2	K1	CO4
9.	Outline the drawbacks of using sight glass for measuring levels.	2	K2	CO5
10.	How does a float type level indicator function?	2	K2	CO5

PART - B (5 × 13 = 65 Marks)
Answer ALL Questions

			Marks	K-Level	CO
11.	a)	Elaborate on the construction and operational principle of the following devices with detailed diagrams. (i) Dry & Wet bulb Psychrometer (ii) Saybolt Viscometer	13	K2	CO1

OR

			Marks	K-Level	CO
	b)	Mention the different methods of moisture measurement and Explain the operational mechanism of any three methods with neat sketch.	13	K2	CO1

				Marks	K-Level	CO
12.	a)	i)	What is meant by pyrometers? Explain in detail about Total radiation pyrometers.	7	K2	CO2
		ii)	Elucidate the construction and operational principle of the Bimetallic Thermometer, supplemented by a detailed diagram.	6	K2	CO2

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create   ***12676***

b) Explain the construction and operational principles of a Dead Weight Tester, illustrating its functioning within a calibration context.   *13*   *K2*   *CO2*

13. a) Explain the construction and working of following with necessary sketch.   *13*   *K2*   *CO3*
     (i) Venturi tube
     (ii) Pitot tube

OR

b) Provide a detailed overview of the construction and working mechanisms of two types of Thermal Mass Flow Meters with necessary sketches.   *13*   *K2*   *CO3*

14. a) i) Explain in detail about construction and working of ultrasonic flow meter with necessary sketch.   *7*   *K2*   *CO4*

   ii) Describe the guidelines for Selection of flow meters.   *6*   *K2*   *CO4*

OR

b) Write Short notes on   *13*   *K2*   *CO4*
     (i) Target flow meter
     (ii) Solid flow measurement

15. a) Explain the construction and working of Ultrasonic level measurement and also mention its advantages and disadvantages.   *13*   *K2*   *CO5*

OR

b) Explain the method of differential Pressure type and hydra step type Boiler Drum level measurement techniques   *13*   *K2*   *CO5*

PART - C (1 × 15 = 15 Marks)

16. a) i) A fluid with a density of 1000 kg/m³ is flowing through a pipe with an orifice plate installed. The diameter of the orifice is 10 cm, and the pressure difference across the orifice is measured to be 100 kPa. During an experiment, the actual flow rate through the orifice is measured to be 0.05 m³/s. Calculate the discharge coefficient (Cd) for this orifice plate.   *5*   *K3*   *CO3*

   ii) Investigate how various types of tapping influence the performance of an orifice plate.   *10*   *K2*   *CO3*

OR

b) i) Discuss the challenges associated with open channel flow measurement and compare different methods used for flow rate determination in open channels.   *10*   *K2*   *CO4*

   ii) A Laser Doppler Anemometer (LDA) is used to measure the velocity of air flow in a wind tunnel. The LDA emits two laser beams separated by a known distance of 2 mm. The frequency shift measured between the two beams is 5 MHz. Calculate the velocity of the air flow in meters per second.   *5*   *K3*   *CO4*