B.E. Instrumentation Engineering (Model Curriculum) Semester - IV

IN404M - Industrial Instrumentation

P. Pages : 2 **GUG/S/23/14017**

Time : Three Hours * 2 7 5 4 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.
5. Illustrate your answers wherever necessary with the help of neat sketches.

1. a) Explain the construction and working principle of Bimetallic thermometer. State its advantages, disadvantages and application. **8**

b) Demonstrate with circuit diagram how temperature is measured using Resistance Temperature detector (RTD). **8**

OR

2. a) Define Thermistors. Discuss the types of thermistors with construction and working principle. State its advantages, disadvantages and applications. **8**

b) Classify thermocouples and Resistance Temperature detector (RTD) with the help of **8**
i) Temperature range
ii) Materials used
iii) Accuracy
iv) Applications.

3. a) Sketch and discuss in detail construction and working principle of Ionization vacuum pressure gauge. State its advantages, disadvantages and applications. **8**

b) Draw and explain how the pressure is measured with U-tube Manometer. State its advantages, disadvantages and applications. **8**

OR

4. a) Sketch and discuss in detail construction and working principle of Thermocouple vacuum gauge. State its advantages, disadvantages and applications. **8**

b) The McLeod gauge is used for vacuum pressure measurement with P-vacuum pressure to be measured, V-Volume of vacuum gas before compression, A_c – Area of cross section of measuring capillary and h-the difference in height of Mercury in reference and measuring capillary. Prove that $P = \frac{A_c h^2}{V}$. **8**

5. a) Discuss with equation the construction and working of Ultrasonic flow meter. List its advantage, disadvantage and applications. **8**

b) What is Venturi-meter? Discuss with neat diagram how flow rate is measured using Venturi-meter. Also state its advantages, disadvantages and applications. **8**

OR

6. a) What is Flow-nozzle? How it is different from orifice meter? Discuss in detail the flow measurement using Flow-nozzle. Also state its advantages, disadvantages and applications. **8**

b) What is Coriolis Effect? Illustrate the working principle and construction of Coriolis Mass Flow Meter. **8**

7. a) Sketch and explain the working principle of ultrasonic type level measurement in detail. **8**

b) Discuss with neat diagram the closed tank level measurement using DP Transmitter. **8**

OR

8. a) Illustrate the usage of smart sensors in various industry sectors. State its characteristics and advantages. **8**

b) Enlist various direct level measurement methods. Elaborate air purge method in short. **8**

9. a) Discuss need of humidity measurement. Explain any one method in detail. **8**

b) Describe the working principle of conductivity meter with suitable diagram. State the different industrial usage of conductivity meter. **8**

OR

10. a) Discuss with neat diagram the measurement of pH value using pH meter. **8**

b) Sketch and explain the working principle of dew point meter in detail. **8**

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