B.E. Instrumentation Engineering Sem-IV

IN403 - Sensors and Transducers-II

P. Pages : 2 **GUG/S/19/1576**

Time : Three Hours * 1 2 2 5 * Max. Marks : 80

Notes : 1. Same Answer book must be used for all question.
2. All questions carry marks as indicated.
3. Due credit will be given to neatness and adequate dimensions.
4. Assume suitable data wherever necessary.

1. a) Differentiate in between RTD and thermocouple. **6**

b) State the principle of radiation pyrometry. List its types. Explain any one with the help of neat diagram. **10**

OR

2. a) Draw and discuss any mechanical type of temperature sensor. List its advantages and disadvantages. **8**

b) Discuss the following w.r.t. thermocouple. **8**
i) Cold junction compensation.
ii) Types of thermocouples.

3. a) List liquids that can be used as manometric liquid along with their characteristics. Draw and explain working of ring balance manometer. **10**

b) Elaborate working of bourdon tube pressure gauge. **6**

OR

4. a) State need of low pressure measurement. Explain any one sensor for vacumme pressure measurement. **8**

b) Draw and discuss dead weight tester in detail. **8**

5. a) A submarine moves horizontally in the sea and has its axis much below the surface of sea water. A pitot tube properly placed just in front of the submarine is connected to a differential pressure gauge. The pressure differential between the pitot pressure and static pressure was found to be $20\,kN/m^2$. Find the speed of submarine if the density of sea water is $1026\,kg/m^3$ **8**

b) Describe variable area type Flowmeter List its typical advantages. **8**

OR

6. a) Draw and discuss Electromagnetic flow meter in detail. **10**
List the typical conditions for flow measurement.
Derive the expression for voltage produced for a given flow rate.

b) Define the following. **6**
   i) Newtonian and Non-Newtonian fluids.
   ii) Reynolds number.
   iii) Density of Fluids.
   iv) Beta ratio

7. a) Describe the construction and working principle of psychrometer used for humidity measurement. **8**

b) Explain Bio sensors in detail. **8**

OR

8. a) Define the following. **8**
   i) Dew point.
   ii) Relative humidity.
   iii) Specific humidity.
   iv) Absolute humidity.

b) Discuss infrared absorption humidity sensor in detail. **8**

9. a) Draw and explain air bubbler technique for level measurement. **8**

b) Discuss Fiber optic level sensor with neat diagram. **8**

OR

10. a) State the principle behind displacer type level sensor. Explain working of torque tube unit. **8**

b) Elaborate with typical applications ultrasonic level sensor in detail. **8**

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