*Total no. of printed pages:*5 **D/4th/DIE405**

2021

INSTRUMENTATION AND PROCESS CONTROL

FULL MARKS: 60

Time: Two hours

A MULTIPLE-Choice Questions 1x20=20

1. The following transducer is an Inverse transducer:

   a. Strain Gauge
   b. LVDT transducer
   c. Piezo electric transducer
   d. Pneumatic Flapper nozzle amplifier

2. Which one of the following sensos is used for the measurement of temperature in a combustion process (T > 1800 deg C)?

   a. Type K Thermocouple
   b. Thermistor
   c. Resistance to temperature detector
   d. Pyrometer

3. Which of the following error is caused by poor calibration of the instrument:

   a. Gross Error
   b. Precision Error
   c. Random Error
   d. Systematic Error

4. The advantage of using Pi controller is:

   a. Improve the system response time
   b. Reduce offset error
   c. To make the loop unstable by the Lag introduced.
   d. None of the above

5. Mass flow is measured by:

a. Magnetic Flowmeter
b. Orifice based Differential Pressure transmitter
c. Coriolis Flowmeter
d. Rotameter

6. The Flapper and Nozzle unit is used as:

a. Passive transducer
b. Active transducer
c. Displacement transducer
d. Inverse transducer

7. In a Pressure thermometer filled with liquid the Bourdon tube is considered as:

a. Data transmission element.
b. Variable manipulation element.
c. Variable conversion element.
d. Data presentation element.

8. A transducer converts:

a. Mechanical energy into electrical energy
b. Electrical energy into mechanical energy
c. Any form of input energy to another form of energy
d. a and b

9. Capacitive devices are used to measure level of:

a. Foams
b. Gas
c. Vapors
d. Non conductive liquids

10. Thermocouple works on the following principle:

a. Ohms law
b. Charles law
c. Kirchhoff law
d. Seeback effect

11. In LVDT the displacement of the core induces an emf due to magnetic induction at the secondary windings. The core is made of:

a. Insulated rod
b. Ferromagnetic rod
c. Ebonite rod.
d. Aluminum rod

12. Thermistors are made of:

a. Ultra pure metals
b. Iron Copper alloys
c. Nickel Chromium alloys
d, Metal oxides

13. The operation of a Rota meter is based on:

a. Rotation of float
b. Pressure drops across a float
c. Pressure at a stagnation point
d. Variable flow area

14. An inductive conductivity sensor is preferred in conductivity measurement because:

a. Ionisation level is increased
b. Polarization level is increased
c. Galvanic isolation from the fluid
d. Highly sensitive to fouling of electrodes

15. The Thermocouples are often chosen because of:

a. High accuracy.
b. Ability to measure high temperature.
c. Economy.
d. Ability to measure an extremely narrow span of temperature.

16. Strain gauge is a:

a. Inductive transducer
b. Capacitive transducer
c. Passive transducer
d. Active transducer

17. The sensitivity of the following temperature measurement device is high:

a. Resistance to Temperature detector
b. Thermistor
c. Bimetallic thermometer
d. Thermocouple

18. In foamy liquid the following level measurement technique is most suitable:

a. 3D technique
b. Radar
c. Ultrasonic
d. Tuning fork

19. The biosensitive element used in Biosensor is:

a. Antibody
b. Nucleic acid
c. Enzyme
d. All the above.

20. In pH measurement the KCl liquid in the reference electrode is provided to:

a. Complete the chemical reaction with the solution.
b. Complete the electrical continuity with the solution.
c. Complete the H+ ion balance with the solution.
d. None of the above.

B Very Short Question 2*6=12

1. Explain any two types of Pressure sensing elements used in measurement of Pressure.

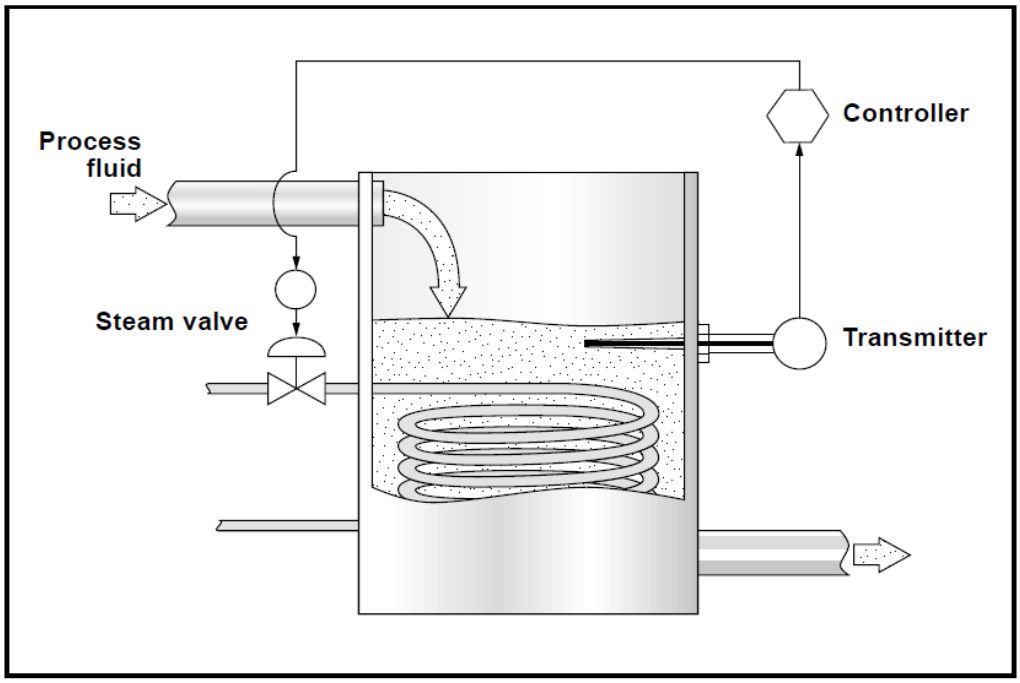
2. Explain Proportional Band of a Proportional Controller. If the gain is 2.5, calculate the PB of the controller.

3. Explain the following characteristic of Control valve - Rangeability.

4. Explain the three modes of control valve status during power failure or Air supply failure.

5. Define the terms Sensitivity and Linearity of a transducer.

6. Draw a neat and label the various components, signal lines (Manipulated variable, controlled variable) of a functional feedback control loop. Refer Figure 1.



Feedback Loop

Figure 1

C Short Question 4*7=28

1. Explain the working of Nuclear radiation Densitometer.

2. Explain the construction and working of Bourdon tube Pressure Gauge.

3. Explain the principle and working of ultrasonic type of Flowmeter.

4. Explain how an Air Bubbler level measurement system operates.

5. Describe the construction and working of Bimetallic Thermometer.

6. Describe the working of Laser Turbidity meter.

7. Describe the working of Gas Chromotograph.