TE - Sem - VI (CBSGS) chemical - Instrumentation

23/11/16

Q.P. Code : 574102

(3 Hours) **[Total Marks : 80**

N.B. : (1) Question No.1 is Compulsory.
(2) Solve any three questions out of remaining five questions.
(3) Assume suitable data if required.

1. a) Write short notes on: **15**
   i) Rupture Discs
   ii) Bourdon tube pressure gauge
   iii) Ultrasonic method for Level Measurement
   b) A component manufacture constructs certain resistances to be anywhere between 1.14 KΩ and 1.26 KΩ and He classifies them to be 1.2 KΩ resistors. What is the absolute error? What tolerance should be stated? **5**

2. a) A thermocouple gives an output of 0.4 mV for each degree change in temperature. What will be the word length required when its output passes through an analogue-to-digital converter if temperatures from 0 to 200°C are to be measured with a resolution of 0.5°C? **6**
   b) A stepper motor has a 30-teeth gear with a 5° angle of tum per step. For a desired rotational speed of 200 rpm, what input pulse rate (in pulses per second) is required? **6**
   c) Write a short note on control valve characteristics. **8**

3 a) Explain Wheatstone bridge in detail. **5**
   b) The plate separation of a parallel plate capacitor was changed from 5 inches to 3 inches. Will the capacitance increase or decrease? What is the percent change in capacitance? **5**
   c) Write short notes on **10**
   i) Basic process control scheme with diagram.
   ii) Layers of protection analysis (LOPA) methods

4 a) A Platinum resistance thermometer has a resistance of 100Ω at 0°C and the value of temperature coefficient of resistance is 0.00385. In operation the resistance is 101 Ω. calculate the temperature. **6**
   b) Explain importance of calibration also explain calibration of Rotameter. **8**

TURN OVER

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Q.P. Code :

c) A DAQ card of 12 bit resolution and 20-60 mA analog current loop is used to record above atmospheric pressures. Even a slight change in pressure (~ 1 Pa) needs to be detected. What is the maximum absolute pressure that can be measured? What is the analog input in mA for a pressure change of 10 kPa? **6**

5. a) The output of a thermocouple measuring temperatures from 20°C to180 °C is linearly represented by the standard current range of 4-20 mA. Then, **10**
(i) What is the current at 110°C?
(ii) What temperature does a current of 8.4 mA represent?
(iii) What is the current at 130°C?
(iv) What temperature does a current of 10 mA .

b) Explain ultrasonic method for level measurement in detail **5**

c) State the principal involved in following sensing elements- **5**
i. Linear Variable Differential Transformer.
ii. Resistance Temperature Detector.
iii. Flapper Nozzle
iv. Bellow pressure sensor
v. Resistance strain gauge

6. Write short notes on (any four): **20**
a) Turbine type flow meter
b) Mechanical amplifier
c) Hot wire anemometer
d) Programmable logic controller.
e) piezo electric sensing element

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