

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER- V • EXAMINATION-SUMMER 2015

Subject code: 151402**Date: 11/05/2015****Subject Name: Food Process Instrumentation and Control****Time: 2.30PM-5.00PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) (a) For a certain thermistor $\beta = 3140K$ and the resistance at $27^{\circ}C$ is known to be 1050Ω . The thermistor is used for temperature measurement and the resistance measured is as 2330Ω . Find the measured temperature. **14**

(b) A 12m length copper rod heated to $30^{\circ}C$ and then there is a temperature change from 0° to $100^{\circ}C$, how much copper rod expands if $\alpha = 2.5 \times 10^{-5}/^{\circ}C$.

(c) A 6V/2.5mA relay is connected in the output stage of a transistor. The coil is made of aluminium having $\alpha = 0.004$. The resistance of a coil is 600Ω at $32^{\circ}C$. Calculate the resistance of a coil at $42^{\circ}C$.

Q.2 (a) Discuss the followings **07**

1. Vena contracta
2. Discharge coefficient
3. Reynolds number
4. LVDT type hydrometer

(b) What is rotameter? Explain the working of rotameter and turbine flow meter with detailed diagram. **07**

OR

(b) 1. The resistance of a wire is 60Ω at $25^{\circ}C$ and 65Ω at $75^{\circ}C$. Find the resistance of wire at $0^{\circ}C$ and value of temperature coefficient at $0^{\circ}C$. **07**

2. The field resistance of a DC machine is 50Ω at $20^{\circ}C$. The resistance increases to 55Ω at $50^{\circ}C$. Find the temperature coefficient of the resistance material.

Q.3 (a) Write the short notes on; **07**

1. Peltier effect and Seebeck effect
2. Advantages and disadvantages of mercury.
3. Hook gauge method

(b) Write a short note on first order systems. What is sensitivity? The spring balance sensitivity at $25^{\circ}C$ and $35^{\circ}C$ is $20mm/kg$ and $35 mm/kg$. What is the value of sensitivity drift/ $^{\circ}C$ for a given spring balance? **07**

OR

Q.3 (a) Explain the following terms with figure (Any three) **07**

1. Dead space
2. Resolution
3. Linearity
4. Closed loop systems

- (b) Give the working principle of McLeod gauge with diagram. Discuss Bubbler method and capillary tube viscometer. **07**
- Q.4** (a) What is the principle of thermocouple? List out its factor of selection. State different laws of thermocouple. **07**
- (b) Derive a standard equation for first order instrument. Write in detail about feed forward control system. **07**

OR

- Q.4** (a) How can you differentiate turbidity and colour as a instrumentation point of view? Describe different instruments used for the measurement of turbidity. Provide the list of wavelength for different colour. **07**
- Q.4** (b) Discuss different methods of temperature measurement? Explain the working of bimetallic thermometer and vapour pressure thermometer. **07**
- Q.5** (a) Write the specific application of following equipments in one line; Knudsen gauge, Efflux meter, Pitot tube, Saccharometer, Thermohydrometer, Aerometer, Rotameter, McLeod Gauge **07**
- (b) What are different types of scale to measure specific gravity measurement? Discuss the working of target and magnetic flow meters with diagram **07**

OR

- Q.5** (a) Discuss the Absolute, Gauge and Differential pressure devices. Draw the diagram of the following pressure measuring elements **07**
1. Diaphragm
 2. Inclined manometer
 3. Bourdon gauge
- (b) Draw the diagram and discuss the working of the following instruments **07**
1. Purge liquid level meter
 2. Hair hygrometer
