KERALA AGRICULTURAL UNIVERSITY
B.Tech.(Food Technology) 2020 Admission
VI Semester Final Examination – July 2023

Beas.3212 **Instrumentation and Process Control in Food Industry (2+1)** **Marks: 50**
Time: 2 hours

I **State True or False** **(10x1=10)**

1. Law of intermediate metals in thermocouples allows them to use reference junction compensation.
2. Drift, static error, dead zone and non-linearity are the undesirable static characteristics of a measurement systems.
3. Bandwidth, a frequency domain concept, is indicative of steady state error in the domain.
4. Dynamic response consists of steady state and transient frequency response.
5. An on-off controller switches the control output on or off depending on whether the process variable is above or below the setpoint.
6. Pyrometers are not affected by electromagnetic interference, so they can be used in environments with high levels of electrical noise.
7. A PID controller combines proportional, integral, and derivative control actions to achieve stable and accurate control.
8. Enzyme sensors are used primarily in medical applications.

Fill in the blanks

9. A thermocouple is an example of a transducer that converts ..... energy into .....energy.
10. A ..... filter is a type of filter that attenuates frequencies above a certain cutoff frequency, while passing frequencies below that cutoff frequency.

II **Write short notes on ANY FIVE of the following** **(5x2=10)**

1. What is accuracy in a measurement system?
2. How can density be measured using a densitometer?
3. How can pH be measured using a colorimetric sensor?
4. What is the working principle of a thermocouple?
5. What are self-generating transducers?
6. Explain the working principle of differential flow meters.
7. How is moisture content measured?

III **Answer ANY FIVE of the following** **(5x4=20)**

1. Derive the mathematical model of a first order liquid level system.
2. What is flow ratio control, and how does it differ from traditional flow control?
3. What is a Nyquist plot, and how does it differ from a Bode diagram in terms of the information it provides?
4. How does a capacitance level sensor work for measuring liquid levels?
5. How can automatic valves be used in industrial applications?
6. With the help of block diagram explain the working of a computer based data acquisition system.
7. Explain briefly about the control actions taking place on a pneumatic controller.

IV **Write an essay on ANY ONE of the following** **(1x10=10)**

1. Describe the different electrical methods for measurement of liquid level. Compare their advantages and disadvantages.
2. Explain in detail about the static and dynamic characteristics of an instrument.

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