

M.Tech
(SEM II) THEORY EXAMINATION 2017-18
Advance Instrumentation Control

Time: 3 Hours

Total Marks: 70

- Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**
- What do you meant by thermocouple? Write some uses of thermocouple.
 - Draw and explain a block diagram of active transducer.
 - What do you understand by characteristics of static transducer?
 - Explain peltier effect in active transducer.
 - What do you mean by tuning of multivariable controllers?
 - Discuss open loop response for impulse and sinusoidal inputs.
 - Explain piezoelectric transducer?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**
- Set up a system of jacketed tank used to preheat a process stream. On assuming the capacity of the tank wall to be negligible and temperature inside the jacket to be uniform distributed, determine the response and order of the system.
 - A thermometer is at room temperature of 25°C. It is suddenly put onto vessel containing boiling water at 100°C. What should be the time constant of the thermometer so that it indicates 99.9°C in 1 minute?
 - Discuss the effect of measurement lag and time delay in level measurement.
 - Set up an interactive system with one element as 'Dead-end system' and also determine the response and other of the system.
 - Describe construction and design of piezoelectric transducer. What are the uses of this transducer?

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**
- Discuss hall transducer and its application. What is the unit of K_H in hall transducer?
 - For a 1st order system in level control system, measuring the level of a tank, using P-controller, derive the expression for controller with step and ramp change made in the load.
4. Attempt any *one* part of the following: **7 x 1 = 7**
- For a single capacity process, discuss the effect of PI-control action
 - Explain with suitable schematic diagram, for pressure control schemes of distillation column.

5. **Attempt any *one* part of the following:** 7 x 1 = 7
- (a) Write a brief note on Laplace domain analysis of cascade control.
 - (b) What are ratio and override control schemes?
6. **Attempt any *one* part of the following:** 7 x 1 = 7
- (a) Discuss optimum controller settings of damped oscillation method.
 - (b) Explain with suitable schematic diagram of internal reflux control.
7. **Attempt any *one* part of the following:** 7 x 1 = 7
- (a) Draw a block diagram for controlling the column pressure by regulating the flow of water to condenser.
 - (b) What are the basic modules of a PLC? Describe the interconnections amongst modules.

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