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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Make-Up Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**
Course Code: 19EI5PCPCS **Max Marks: 100**
Course: Process Control Systems **Date: 17.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Describe the working of process control system with a neat diagram. **06**

b) With an example of cracker baking system, illustrate the operation of process control system for final control operation. **06**

c) A 4 bit digital word is intended to control the setting of 2Ω DC resistive heater. Heater output varies as 0-24V input to heater using 10V DAC followed by an amplifier with high current output. Calculate **08**

i. Settings from minimum to maximum heat dissipation.
ii. How power varies with LSB change.

UNIT - II

2 a) Classify the general types of signal conditioning in analog circuits. Briefly explain the concept of signal level and bias changes, linearization. **08**

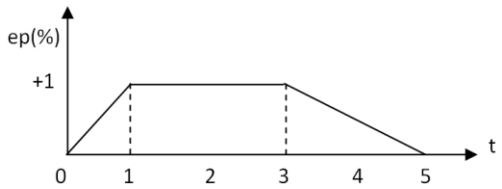
b) A sensor outputs a range of 20-250mV as a variable varies over its range. Develop a signal conditioning so that it becomes 0-5V. the circuit must have very high input impedance **04**

c) Illustrate the working of integral control mode with error signal and summarize the characteristics of it. **08**

OR

3 a) Discuss the working of integrator and differentiator with op-amp circuit and necessary equations. **10**

b) For the error graph shown, applied to a PD controller with Kp=5, Kd=0.5Sec and P0=20%. Draw a graph of resulting controller output. **10**



UNIT - III

4 a) Mention the general features of analog controller and list different parts of analog controller. **04**

b) Derive an expression for 2 position controller using op-amp with a graph for neutral zone signal. **08**

c) A temperature control system inputs the controller variable as a range from 0-4V. The output of a heater requiring 0-8V. A PID is to be used with Kp=2.4%/%, Ki=9%/% min, Kd=0.7%/(%/min). The period of the fastest expected change is estimated to be 8Secs. Develop the PID circuit. **08**

OR

5 a) With an example of tank level system, describe the function of multi-variable alarm. **08**

b) Explain the working of supervisory system used for monitoring, measurement and output control using computer. **08**

c) Write the flow chart for derivative mode with its equation used in digital controller. **04**

UNIT - IV

6 a) Explain open loop transient response method of process loop tuning as applied to PID controller. **10**

b) In the Ziegler-nichols method, the critical gain is found to be 4.2 and the critical period is 2.21 minute. Find the standard setting for **04**
i. Proportional control
ii. PI control
iii. PID control

c) With a neat block diagram, explain the working of cascade process control System. **06**

UNIT - V

7 a) Write a short note on following concepts **10**
i. Availability system
ii. Reliability system

b) List and explain various hazards in process industries. **10**

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