Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Sixth Semester B.Tech Degree Regular and Supplementary Examination July 2021

Course Code: IC308
Course Name: PROCESS CONTROL INSTRUMENTATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) Explain various types electric actuators used in process control applications. (8)

b) Explain the mechanism behind the working a direct and reverse acting pneumatic actuator. (7)

2 a) How feedback and feedforward control actions can be used to suppressing the influence of external disturbances on the process. (8)

b) Analyse the effects of PI and PID control modes on the process. (7)

3 a) Explain the concept of single speed floating control action and multiple speed floating control action. (8)

b) Explain the characteristics of two position mode and three position discontinuous controller modes. (7)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Using OP AMP circuits illustrates the methods implementing single modes of control action. (7)

b) With neat sketch, explain the working of P pneumatic controller. (8)

5 a) Design a Proportional – Integral controller with a proportional band of 30% and an integration gain of 0.1 % / (% * sec). The 4 – 20 mA input converts to a 0.4 – 2 V signal, and the output is to be 0 -10 V. Calculate values of G_P , G_I , R_2 , R_1 and C respectively. (7)

b) A proportional –derivative controller has 0.4 to 2.0 V input measurement range, a 0 to 5 V output, K_P = 5 % / % and K_D =0.08% per (%/min). The period of the fastest expected signal changes is 1.5 sec. Implement this controller with an op amp circuit. (8)

6	a)	With neat sketch, explain the working of P+I pneumatic controller.	(7)
	b)	Draw and explain the electronic circuit for realizing the P, PI controller modes.	(8)

PART C

Answer any two full questions, each carries 20 marks.

7	a)	Explain process reaction curve method and write cohen-coon feedback controller settings.	(10)
	b)	Explain Zeigler- Nichols controller tuning method.	(10)
8	a)	With a neat block diagram explain Feedforward.	(10)
	b)	With a neat block diagram explain Ratio control.	(10)
9	a)	Explain the cascade control strategy for a typical process with an example.	(10)
	b)	Explain inferential control with neat diagram.	(10)

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