GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2021
PROCESS CONTROL-1(Backlog)
EI601

TIME ALLOTTED: 3HR **FULL MARKS:70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: **10×1=10**

			Marks	CO No.
1.	(i)	If the Proportional B and of P controller is adjusted to minimum possible value, then the controller will act as a) ON/OFF controller b) Integral controller c) Derivative controller d) any one of the above	1	CO1
	(ii)	For a 50 % error to the P controller, its output is 50 %. The proportional band PB is a) 200% b) 150 % c) 50 % d) 100%	1	CO1
	(iii)	The feedback system is unsatisfactory for a) fast process b) sluggish process c) any one of the process d) none of these	1	CO3
	(iv)	Bevelled disc type valve is used for a) decreasing sensitivity b) increasing sensitivity c) linear sensitivity d) all the above	1	CO4
	(v)	Tight shut off is not present in a) single seated valve b) double seated valve c) butterfly valve d) gate valve	1	CO4
	(vi)	Which of the following controllers has maximum offset a) P controller b) PD controller c) PID controller d) I controller	1	CO 1

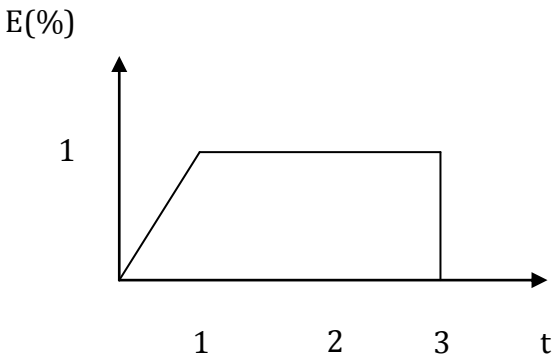
(vii)	In Cascade Control, the controller for secondary loop is a) P controller b) PI controller c) PID controller d) I controller	1	CO3
(viii)	DCS consists of a) local controllers b) interconnected digital data link c) co-ordinating controller d) all the above	1	CO4
(ix)	Which type of isolator is generally used in I/O module of PLC? a) Electrical isolator b) Optical isolator c) Magnetic isolator d) Electronic isolator	1	CO4
(x)	In a temperature control system process variable varies from 40°C to 120°C. What will be the value of controller output for 60°C? a) 12 mA b) 20 mA c) 8 mA d) 4 mA.	1	CO2
(xi)	Stabilization time is minimum in a) I controller b) PD controller c) PID controller d) PI controller	1	CO1
(xii)	Valve -positioner is a high gain a) P controller b) D controller c) PI controller d) I controller	1	CO4

GROUP – B
(Short Answer Type Questions)

Answer any ***three*** from the following: **3×5=15**

		Marks	**CO No.**
2.	Draw & explain the basic block diagram of a process control system.	5	CO1
3.	Explain the working principle of DCS with a schematic diagram.	5	CO4

4.	Plot the graph of a PI controller output as a function time. The error to the controller is shown in fig. Kp=5, KI=1.0 s-1, PI(0)=20%.	5	CO1



5.	Explain the working principle of Ratio control.	5	CO2
6.	Explain the working principle of valve positioner.	5	CO4

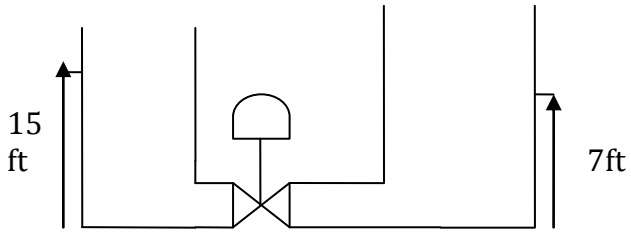
GROUP – C

(Long Answer Type Questions)

(Answer any *three* of the following) **3 x 15 = 45**

		Marks	**CO No.**
7.(a)	Draw and explain the working principle of Electronic PI controller.	5	CO1
(b)	What is offset? Why does it appear? How is it eliminated?	4	CO1
7(c)	Explain the working principle of pneumatic controller and derive the equation of control action.	6	CO1
8.(a)	What do you mean by tuning of controllers? What is ¼ th decay ratio?	4	CO2
(b)	What are the different methods of tuning of controllers?	2	CO2
(c)	What is process reaction curve? How it is obtained? Sketch the S-curve and show the parameters which are used for controller tuning.	5	CO2
(d)	In the Ziegler- Nichols method, the critical gain was found to be 4.2, and the critical period was 2.21 min . Find the standard setting for PID control.	4	CO2
9.(a)	What is Cascade control? Draw the block diagram of cascade control. With a suitable example, explain the function of Cascade control.	7	CO3
(b)	Explain the working principle of a Drum level control system.	8	CO3
10.(a)	Explain the working principle control valve.	5	CO4
(b)	Explain cavitation and flashing phenomena of a valve with the help of relevant diagram.	3	CO4
(c)	Draw and explain the working principle of Air filter regulator.	4	CO4

(d)	Calculate Cv&Kv of the valve for the system shown in figure which regulates the flow of glycerine. Specific gravity of glycerine is 1.4.	3	CO4



11.(a)	Explain the basic block diagram of a PLC.	5	CO 4
(b)	Explain scan time and response time of a PLC.	2	CO 4
(c)	Develop the PLC ladder diagram for controlling the heating of an oven. The system is started with a start button and this can be stopped by a stop button. When the start button is pressed, a horn for the first 10 secs to warn that the oven will start and subsequently the horn stops and the heating starts. When stop button is pressed, oven is turned off, but the fan continues to blow for another 5 minutes before turning off.	8	CO 4