QP Code: RM21BTECH449 | Reg. No | | | | | | | | | | | AY 21

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Sixth Semester Regular) Examinations, May – 2024

21BCHPC36002 – Process Control

(Chemical)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Define ultimate response.	CO2	K1
b.	Differentiate between servo and regulator control problem.	CO3	K4
c.	What is a Bode plot?	CO3	K2
d.	Differentiate between feed forward and feed backward control problem.	CO3	K4
e.	What is z-transform?	CO4	K1

PART – B **(15 x 4 = 60 Marks)**

		Marks	CO #	Blooms Level
	Answer ***ALL*** questions			
2. a.	A thermometer is given the impulse change of magnitude as 10. The time constant of the thermometer is 6 sec. Sketch the response of the thermometer assuming that it is first order system.	10	CO4	K2
b.	Discuss the characteristic of first order system for the step forcing function in the input variable of the system.	5	CO4	K2
	(OR)			
c.	The transfer function of second order system is given as: $G(s) = \frac{Y(S)}{X(S)} = \frac{16}{1.5S^2+2.4S+6}$. A step change of magnitude 6 is given in the input variable of the system. Determine overshoot, rise time, period of oscillation, maximum value of response & ultimate value of response.	10	CO4	K4
d.	Derive transfer function of U-tube manometer.	5	CO4	K3
3.a.	Sketch the root locus diagram for the system having open loop transfer function. $G(s) = \frac{k_c(6s+1)}{s(s+3)(s+4)}$. Indicate all poles, zero, centre of gravity, breakaway point direction in which locus travels. Determine the value of K_c for which system becomes just unstable.	10	CO4	K4
b.	What are different types of controllers? Explain the function of different modes of control.	5	CO4	K2
	(OR)			
c.	The open loop transfer function of a control system is given as: $G(s) = \frac{k_c(s+1)}{s(s+2)(s+3)}$.Determine the Routh stability of it.	10	CO4	K3
d.	Write the stability criteria for a linear system.	5	CO4	K2
4.a.	A PD controller having $K_c$and derivative time 4sec is used to control two first order non-interacting systems in series having time constants 0.5 and 1. It is unit feedback system. Sketch the root locus diagram of the system.	10	CO4	K3
b.	Explain the design criteria of the controllers.	5	CO4	K2

(OR)

c.	The open loop transfer function of a control system is G(s) = $\frac{k_c}{s(0.1s+1)(10s+1)}$. Sketch the asymptotic bode diagram of the control system. Determine the value of k_c for which the control system is stable.	10	CO4	K3
d.	Differentiate between cascade and adaptive control.	5	CO4	K4
5.a.	The open loop transfer function of a feedback discrete time control system is GH(s) = $\frac{k}{s(s+2)(s+4)}$. Taking sampling period T = 1sec. Determine the value of K for which the system is just unstable.	8	CO4	K3
b.	A P controller having K_c is to control two first order systems is having time constants 0.5 and 2 and it is unit feedback system. Determine the stability of the control system using Routh's criterion.	7	CO4	K4

(OR)

c.	The open loop transfer function of a control system is G(s) = $(5s+1)^3$. Sketch the asymptotic bode diagram of the control system.	8	CO4	K3
d.	Differentiate between cascade and adaptive control.	7	CO4	K4

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