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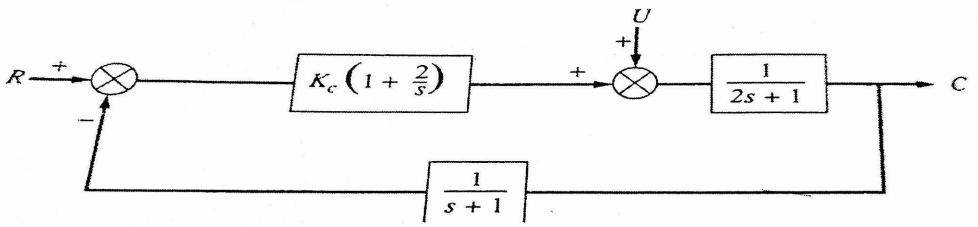
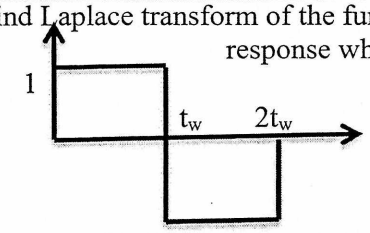
B.Tech. 3rd Year (Semester V)
Process Dynamics and Control [CH-314]
End Semester Examination

Maximum Marks: 50 **Time: 3 Hrs** **Date: 07/12/2022**

1(a)	Use Routh test to determine if the system is stable for $K_c = 4$. Determine ultimate value of K_c above which system is unstable. 	3+1
1(b)	Following differential equation has been obtained as the dynamic characteristics of a given process. Develop state space model and transfer function model of the process. Make assumptions if required. $$a_0\frac{d^2y(t)}{dt^2}+a_1\frac{dy}{dt}+a_2y(t)=b_0x(t)$$	6
2(a)	Find Laplace transform of the following function : t sin(2t) $e^{(-t)}$	4
2(b)	Derive expression for offset of first order system controlled with P-controller(both servo and regulatory).	6
3(a)	Explain the concept of cascade control with suitable example. Also, Develop the block diagram.	5
3(b)	A process has the third-order transfer function (time constant in minutes), $G_p(s) = 2/(0.5s+1)^3$. Also, $G_f = 0.1$ and $G_m = 10$. For a proportional controller, evaluate the stability of the closed-loop control system using the Bode stability criterion and three values of K_c: 1, 4, and 20.	6
4(a)	Plot Nyquist plot for a PID controller	3
4(b)	Plot Bode diagram for a second order system.	6
5(a)	Find Laplace transform of the function given in the figure below. Also, find out the response when this function is introduced in the process, $G(s) = K/(\tau s+1)$ 	2+3
5(b)	Judge stability of a system with $G_c = K_c$ and $G_p = 1/(s+1)(s+4)$ using root locus.	5

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