

2024

Control Systems and PLC

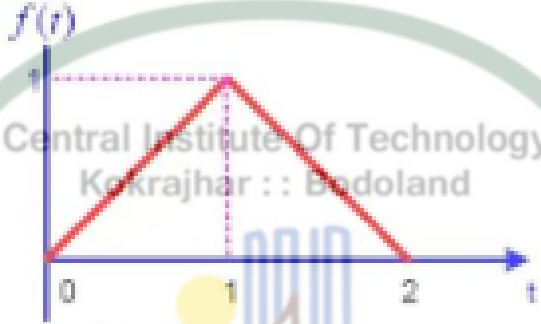
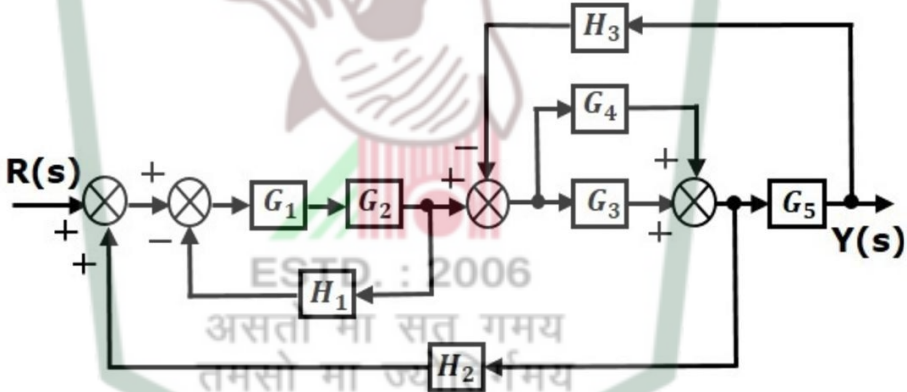
Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1.	<p>Using the Routh Hurwitz criterion comment on the stability of the following system for which the open loop transfer function is</p> <p>A) $G(s)H(s) = \frac{2}{s^2+2}$</p> <p>B) $G(s)H(s) = \frac{2}{s^2(s-2)}$</p> <p>C) $G(s)H(s) = \frac{2}{s(s+2)}$</p> <p>D) $G(s)H(s) = \frac{2(s+1)}{s(s+2)+10}$</p>	<p>5+5+5+5 =20</p>
2.	<p>Consider a control system with the open-loop transfer function $G(s)H(s) = \frac{K(s+2)}{s(s+1)(s+4)}$. You are required to analyze the stability of this control system using the following method:</p> <p>Routh-Hurwitz Criterion: Determine the range of the gain K for which the system is stable using the Routh-Hurwitz criterion.</p>	20
3.	<p>Write a short note on Bode plot.</p>	20

4.	<p>A unity feedback control system has an open loop transfer function</p> $G(s)H(s) = \frac{K s}{(s + 2)(s + 4)}$ <p>Draw the root locus and determine the value of K, if the damping ratio $\zeta=0.707$.</p>	20
5.	<p>Find the Laplace transform of the following</p> <p>(1) $e^{-a t}$ (ii) $e^{-at} \sin (w t)$ and (iii)</p> 	5+5+10
6.	 <p>Find the transfer function $\frac{C(s)}{R(s)}$ for the control system shown above.</p>	20