

TE ELEC C scheme Winter 2025
17/11/25

Time: 3 Hours

Total Marks: 80

N.B: (1) Question No. 1 is compulsory.

(2) Attempt any three from the remaining questions.

(3) Figures to the right indicate full marks.

(4) Use Graph paper and semi log paper wherever necessary.

1. Attempt any four

(A) Write an example of open loop system and Automatic Close loop system

(B) Calculate Steady state error for first order system for unit step and find Position error constant

(C) Explain Nyquist criterion for stability.

(D) Explain advantages of state space approach over conventional approach.

(E) Describe the condition for angle of departure angle of Arrival in root locus.

2. (A) Consider a unity feedback system with close loop transfer function

 $C(s)/R(s) = 2 / (s^2 + 3s + 7)$. Find open loop transfer function. Calculate Steady state error.(B) Determine the range of operating values of K so that system will be stable for the unity feedback system having characteristic equation as $s^4 + 3s^3 + Ks^2 + 2s + 1 = 0$ by Routh Hurwitz Method.3. (A) Find out all time domain parameters for the second order underdamped transfer function $C(S)/R(S) = 12(S^2 + 4S + 8)$. Also find out expression of output response

(B) Find Type of a system, all error constants and find steady state error for unit ramp input.

$$G(S) = 1000(S+2)/S(S^3 + 7S^2 + 12S)$$

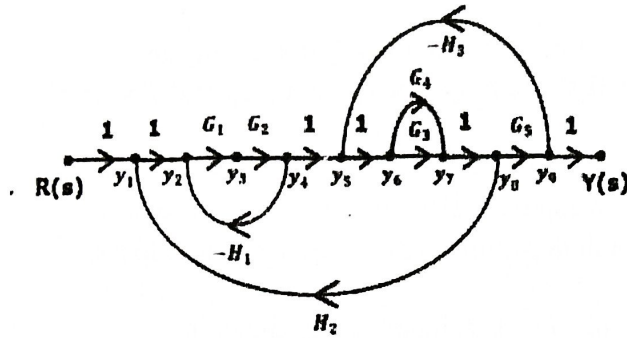
4. (A) Determine gain margin, phase margin, gain crossover frequency and phase cross over frequency for following transfer function:

$$G(s) = \frac{100}{s(s+2)(s+5)}$$

(B) Sketch the root locus for unity feedback system for the transfer function given below:

$$G(s) = \frac{K}{s(s+2)(s+4)}$$

5. (A) Use Mason gain formula to find $C(s)/R(s)$ of following signal flow graph:



(B) Obtain state model of the transfer function $T(F) = (S^2+3S+3)/(S^3+2S^2+3S+1)$. Draw signal flow graph

6. Write notes on any two:

- (A) Write a short note on Time response specifications.
- (B) Define Gain Margin, Phase Margin, Phase cross over frequency and gain Cross over Frequency in frequency domain
- (C) Compute the transfer function from state space model if
 $A = [0 \ 1 \ -3 \ -8]$
 $B = [0 \ 1] \ C = [3 \ 4] \ D = 0$
