08-06-2026 TE ELECTRICAL SEM-V C SCHEME CS QP CODE: 20011534

(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 Closed loop system.
   (B) How to convert a system represented in state space to transfer function?
   (C) Explain Nyquist criterion for stability.
   (D) Explain advantages of state space approach over conventional approach.
   (E) Describe the condition for angle of departure and 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 under-damped transfer function $C(S)/R(S)= 12/(S^2 + 4S + 12)$. Also find out expression of output response.
   (B) For the unity feedback system find the steady state errors for the following test inputs: 5 u(t), 6 t u(t) and 7 t^2 u(t).

$$G(s) = \frac{450(s+8)(s+12)(s+15)}{s(s+38)(s^2+2s+28)}$$

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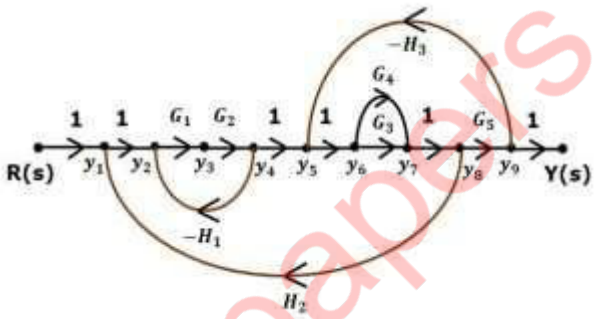
4. (A)Determine gain margin, phase margin, gain crossover frequency and phase cross over frequency for following transfer function:

$$G(s) = \frac{10}{s(s+3)(s+20)}$$

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

$$G(s) = \frac{K}{S(S+1)(S+2)(s+3)}$$

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



(B Represent the following system in state space in phase variable form and draw its state model.

$$G(s) = \frac{20(s+1)(s+2)}{(s+1)(s+4)(s+8)}$$

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) Relation between time response and frequency response performance criteria.

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