Exam. Code: 0929
Sub. Code: 6914

1078

B. Engg. (Electronics & Comm. Engg.)

5th Semester

EC-513: Control Systems

Time allowed: 3 Hours | Max. Marks: 50

NOTE: *Attempt five questions in all, including Q. No. 1 which is compulsory and selecting atleast two questions from each Unit.*

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I. (a) Compare open loop & closed loop control system.

(b) What is D'Alembert Principle?

(c) What is Phase Margin & Gain Margin?

(d) Define stability & relative stability.

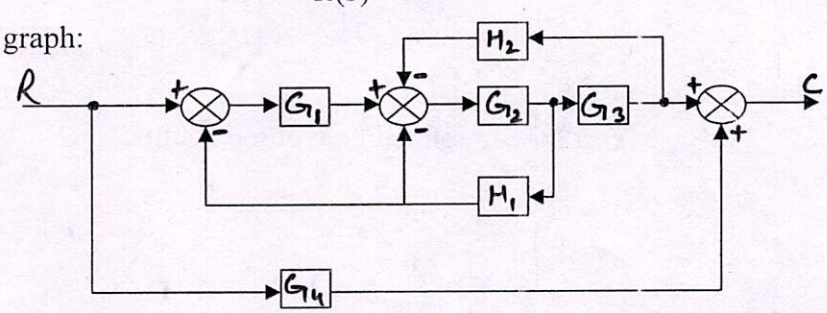
(e) Compute State Transition Matrix (STM) when $A = \begin{bmatrix} -1 & 1 \\ 0 & 2 \end{bmatrix}$ (5×2)

UNIT-I

II. (a) Write note on temperature control system.

(b) What is servomechanism?

(c) Obtain the transfer function $\frac{C(s)}{R(s)}$ for given block diagram using signal flow graph:



(3+2+5)

III. (a) Write note on AC & DC Techo-generators.

(b) For a system having $G(s) = \frac{25}{s(s+10)}$ and unity feedback, find (i) w_n (ii) s (iii) w_d (iv) t_p and (v) M_p. (5+5)

IV. (a) Examine the stability of the system having characteristics equation $s^5+s^4+3s^3+3s^2+4s+8=0$

(b) For a unity feedback system the open loop transfer function is given by:

$$G(s) = \frac{K}{s(s+2)(s^2+6s+25)}$$

(i) Sketch the root locus for $0 \le K \le \infty$

(ii) At what value of K, the system becomes unstable (4+6)

P.T.O.

UNIT-II

V. Sketch the Bode Plot for the transfer function $G(s) = \dfrac{1000}{(1+0.1s)(1+0.001s)}$.

Determine:

(a) Phase margin

(b) Gain margin

(c) Stability of system (10)

VI. Use Nyquist Criterion, determine whether the closed loop system having the following open loop transfer function is stable or not:

$$G(s)H(s) = \frac{1+4s}{s^2(1+s)(1+2s)}$$ (10)

VII. (a) What is compensation? Write note on phase lag network.

(b) A single input single output system is given as

$$x(t) = \begin{bmatrix} -1 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -3 \end{bmatrix} x(t) + \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix} u$$

$$y = \begin{bmatrix} 1 & 0 & 2 \end{bmatrix} x(t)$$

Test for controllability & observability. (5+5)

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