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Total No. of Questions : 09

B.Tech. (Electronics & Communication Engg.) (Sem–5)
CONTROL SYSTEMS
Subject Code : BTEC-504-18
M.Code : 78300
Date of Examination : 06-06-2023

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

   a) Discuss the importance of transfer function.

   b) What do you mean by system response? Explain.

   c) What do you mean by transient accuracy? Discuss.

   d) Define time constant. Discuss its importance.

   e) What do you mean by feed forward control? Discuss.

   f) Discuss the concept of stability in brief.

   g) Explain the importance of tuning of a controller.

   h) List the important characteristics of Non-linear system.

   i) What are the advantages of state variable analysis? Explain.

   j) What do you mean by state model? Discuss.

SECTION-B

2. Determine the gain of the Signal Flow Graph shown in fig.
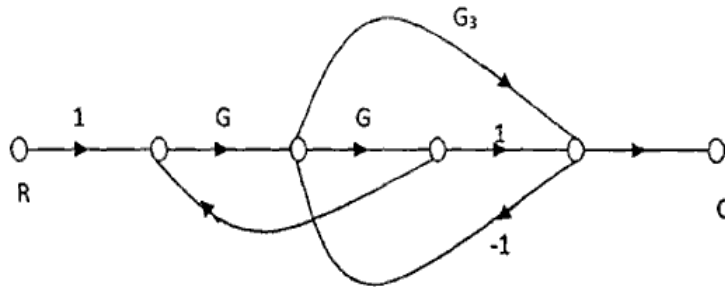
Fig.

3. For a unity feedback control system the forward path transfer function is given by

$$G(s)\,H(s) = \frac{2\left(s^2 + 3s + 20\right)}{s(s+2)\left(s^2 + 4s + 10\right)}$$

Determine the steady state error coefficients of the system. When the inputs are a) 5   b) 4t   c) $4t^{2+}/2$.

4. Find the stability of a closed loop control system having characteristics equation
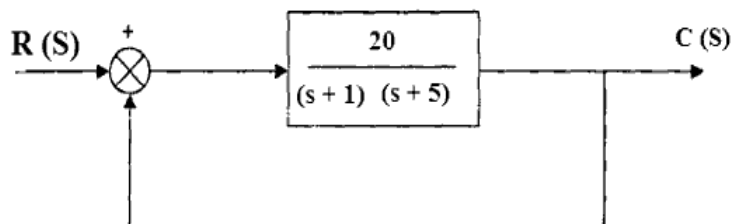
$$s^6 + s^5 + 5s^3 + 3s^3 + 2s^2 - 4s - 8 = 0$$

5. Test the controllability of the system given below :

$$\begin{bmatrix} \dot{x_1} \\ \dot{x_2} \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 1 \end{bmatrix} u(t)$$

6. Explain (in detail) the principle and working of synchro transmitter and receiver used in control systems.

SECTION-C

7. The block diagram of a unity feedback control system is shown in fig.

Fig.

Determine the characteristic equation of the system $\omega_n, \varsigma_n, \omega_d, t_p, M_p$ the time at which the first undershoot occurs and the time period of the oscillations.

8. Sketch the Bode plot for the transfer function $G(s)\,H(s) = \dfrac{2(s+0.25)}{s^2(s+1)(s+0.5)}$.

Determine the gain and phase margin, is the system stable.

9. Discuss

   a) Pneumatic Actuators

   b) Optimal control