

Roll No.

Total No. of Pages : 03

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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.

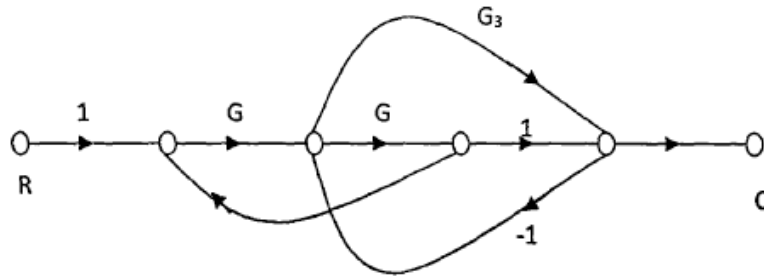


Fig.

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

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

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.

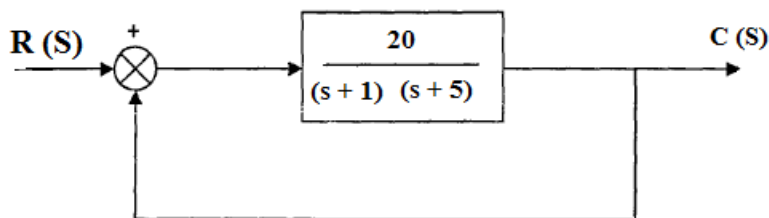


Fig.

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

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

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

9. Discuss
- Pneumatic Actuators
 - Optimal control

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.