GALGOTIAS UNIVERSITY

ADMISSION NUMBER

School of Engineering

B.TECH Electrical Engineering

Semester End Examination - Summer Term Jul/Aug 2024

Duration : 180 Minutes
Max Marks : 100

Sem IV - G2UB407T - Control Systems

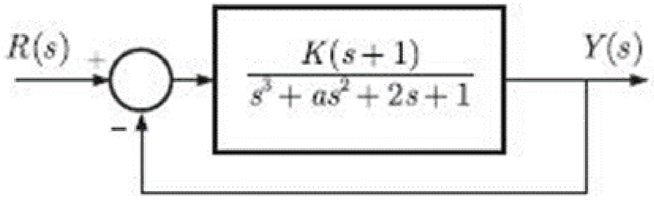
General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1) Define the Nyquist stability criterion and its significance in assessing system stability in the frequency domain. K1 (2)

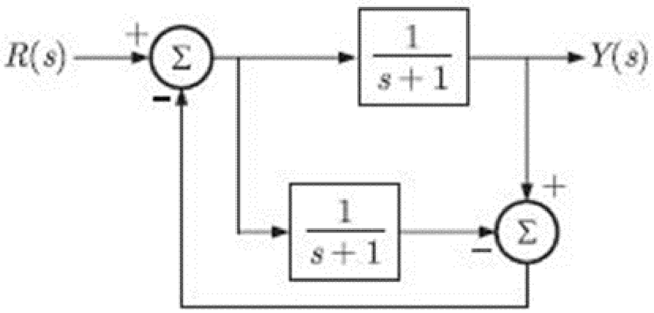
2) Explain steady-state errors and error constants in control systems. K2 (4)

3) Explain the Nyquist stability criterion and how it is applied to assess system stability in the frequency domain. K2 (6)

4) The feedback system shown below oscillates at 2 rad/s. Calculate the value of K and a. K3 (9)

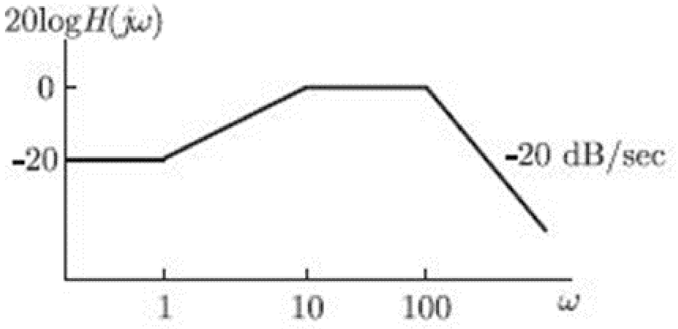


5) Find the transfer function Y(s)/R(s) of the system given below. K3 (9)



6) Discuss the role of steady-state errors and error constants in assessing the accuracy and stability of control systems. K5 (10)

7) Consider the Bode magnitude plot shown in the fig. Find the transfer function [H(s)] of the system. K4 (12)



8) Consider a negative unity feedback system with forward path transfer function G(s)=K/(s+a)(s-b)(s+c) where K, a, b, c are positive real numbers. For a Nyquist path enclosing the entire imaginary axis and right half of the s-plane in the clockwise direction, the Nyquist plot of (1+G(s)) , encircles the origin of (1+G(s)) -plane once in the clockwise direction and never passes through this origin for a certain value of K. Then, find the number of poles of G(s)/1+G(s) lying in the open right half of the s-plane. K5 (15)

9) The open loop transfer function of a system is G(s)H(s)=ks^3/(s+1)(s+2). Draw its Nyquist plot and determine the range of k for close loop system to be stable. K5 (15)

10) Consider the control system whose signal flow graph is shown below. Determine the system transfer function using Mason's formula. K6 (18)