

Roll No.:

National Institute of Technology, Delhi

Name of the Examination: B. Tech. / M. Tech. / Ph.D.

Mid-Semester Examination March, 2019

Branch: ECE

Title of the Course: Control Theory

Time: 2 Hours

Semester: 4th

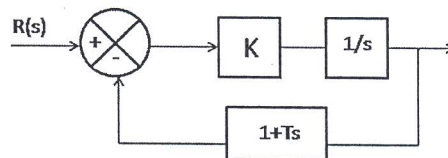
Course Code: ECL-251

Maximum Marks: 25

Note: Attempt all questions

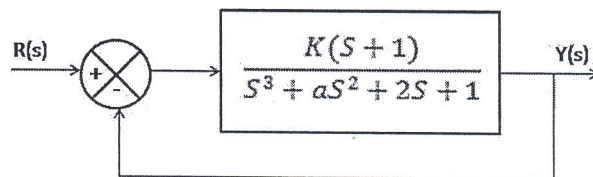
Q.1 For a unity feedback control system the open loop transfer function is $G(s) = \frac{K}{s(s+1)}$. Find the steady state error due to unit step function. [2]

Q.2 For a closed loop system shown below, determine the value of K and T such that the maximum overshoot to the unit step input is 25% and the peak time is 2 sec. [3]

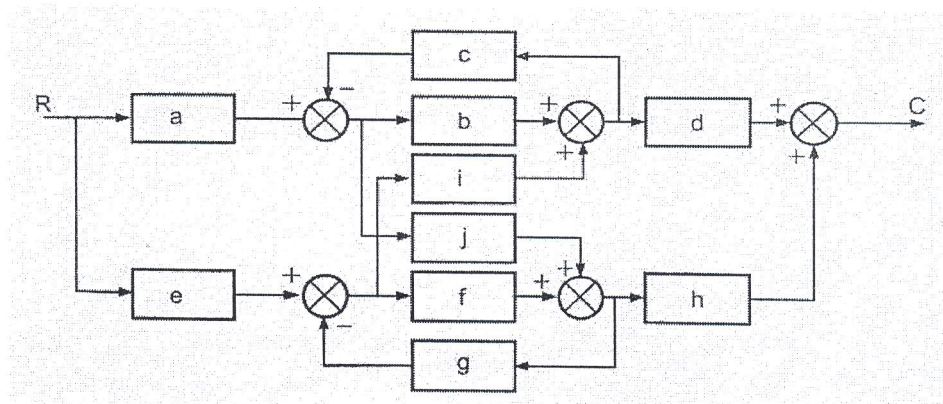


Q.3 The forward transfer function of a unity feedback type 1, second order system has a pole at -2. The nature of the gain K is so adjusted that damping ratio is 0.4. The above equation is subjected to the input $r(t) = 1+4t$. Find the steady state error. [4]

Q.4 Find the value of K and a for which feedback system shown below oscillate at 2 rad/sec. [4]



Q.5 Draw the signal flow graph and determine the overall transfer function. [4]



Q.6 Draw the Nyquist plot for the given transfer function and find the positive value of K for which the closed loop operation is stable. Find the value of K for obtaining gain margin 3 db. For this gain margin find the phase margin and gain and gain cross over frequencies. [8]

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