Total number of printed pages: 2 **UG/5th /UECE502**

2024

Control System

Full Marks : 100

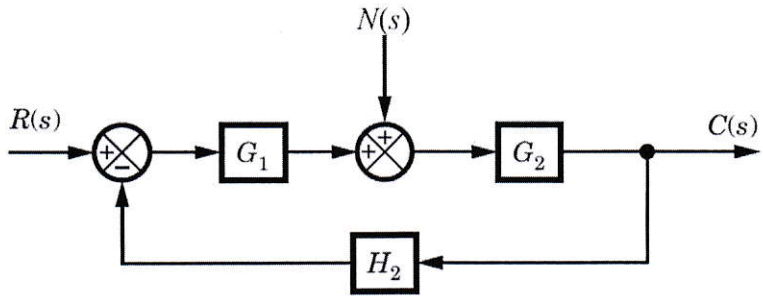
Time : Three hours

The figures in the margin indicate full marks for the questions.

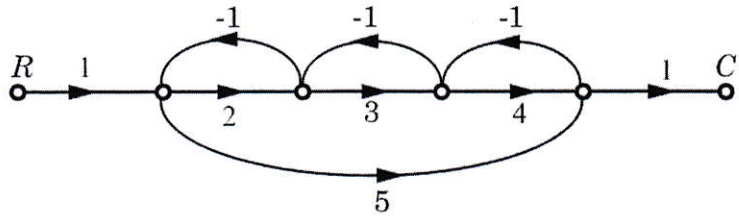
*Answer **any five** questions.*

Question 1 (a): Find the equivalent transfer function of three blocks in parallel with transfer function given as $G_1(s) = \frac{1}{(s+1)}$, $G_2(s) = \frac{1}{s+4}$, and $G_3(s) = \frac{s+3}{s+5}$. [10]

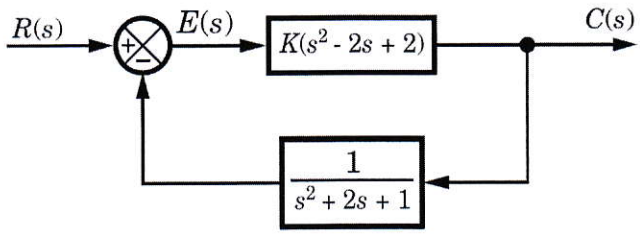
Question 1 (b): For a feedback control system subjected to noise $N(s)$. Find the noise transfer function $\frac{C(s)}{N(s)}$. [10]



Question 2 (a) Using the Mason's gain formula, find $\frac{C}{R}$ for the following signal flow graph. [10]



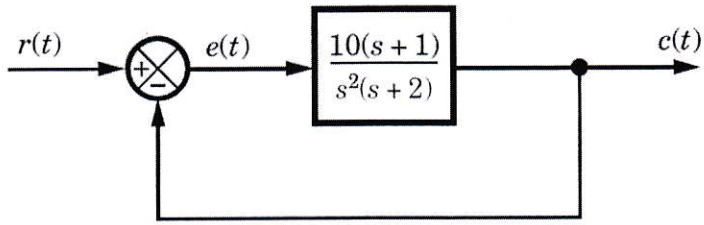
Question 2 (b) Find the range of values of K for which the following system is stable. [10]



Question 3 (a) Comment on the stability of the unity feedback control system for which the forward path gain is $G(s) = \frac{1}{4s^2(s^2+1)}$. [10]

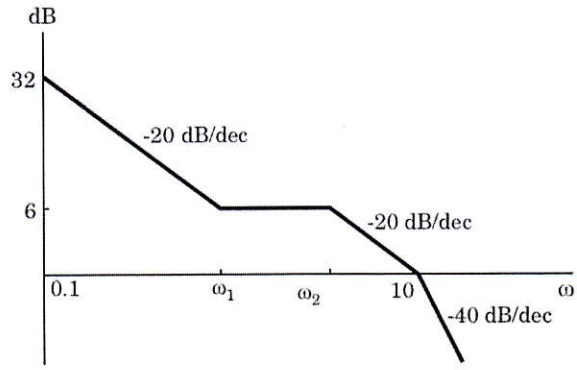
Question 3 (b) The forward path transfer of a unity feedback control system is $G(s) = \frac{1000}{(1+0.1s)(1+10s)}$. Find the step, ramp, and parabolic error constant. [10]

Question 4(a): For the system given below with $r(t) = 1 + 2t$. Find the steady state error $e(t)$. [10]



Question 4(b) For the open loop transfer function of a unity feedback system $G(s) = \frac{1+s}{s(1+0.5s)}$. Find the corner frequencies. [10]

Question 5: For the following bode plot, find the transfer function. [20]



Question 6 The open loop transfer function of a feedback control system is $G(s)H(s) = \frac{-1}{2s(1-20s)}$. Draw the Nyquist plot and comment on the stability of the control system. [20]

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