SE - 461

Total No. of Pages : 3

Seat No.	

T.E. (Electronics and Telecommunication) (Semester - V) Examination, November - 2017
CONTROL SYSTEMS (Revised)
Sub. Code : 66315

Day and Date : Thursday, 22 - 11 - 2018 **Total Marks : 100**

Time : 10.00 a.m. to 01.00 p.m.

Instructions :
1) All questions are compulsory.
2) Assume data wherever necessary.
3) Figures to the right indicate full marks.

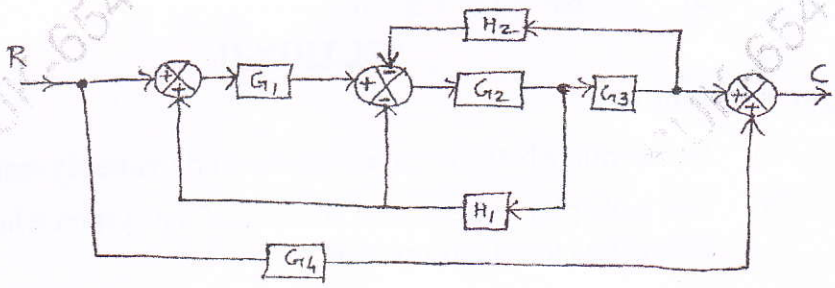
SECTION-I

Q1) Solve any two **[2 × 9 = 18]**

a) Derive transfer function of armature controlled DC motor.

b) Explain block diagram reduction rules.

c) Using block diagram reduction rules find the closed loop transfer function for the following system.



Q2) Solve any two **[2 × 8 = 16]**

a) Define i) position error constant ii) velocity error constant iii) acceleration error constant. Calculate the steady state errors for unit step, unit ramp and unit parabolic input signals in case of Type-0 system.

b) For unity feedback system $G(s) = \dfrac{10}{s(1+2s)(1+s)}$

Determine i) type of system

ii) steady state error constant.

iii) steady state error if input is $r(t) = 1 + t + t^2/2$

c) Define Mason's gain formula and explain various signal flow terms.

P.T.O.

Q3) Solve any two [2 × 8 = 16]

a) Explain the rules to draw the root locus.

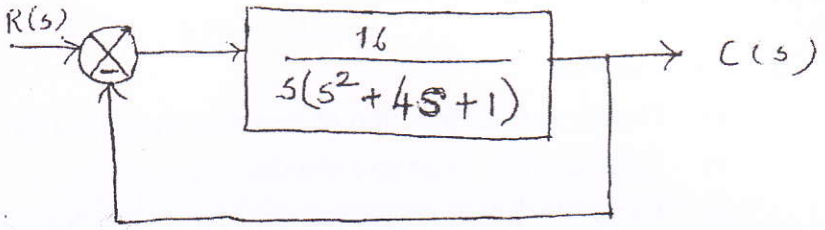
b) The open loop transfer function of a unity feedback control system is given by

$$G(s) = \frac{K}{(s+2)(s+4)(s^2+6s+25)}$$

By applying the routh criterion, discuss the stability of the closed loop system as a function of K. Determine the values of K which will cause sustained oscillations in the closed loop system. What are the corresponding frequencies.

c) By means of routh criterion determine stability of the system. For unstable system determine the number of roots in right half S-plane.

i)



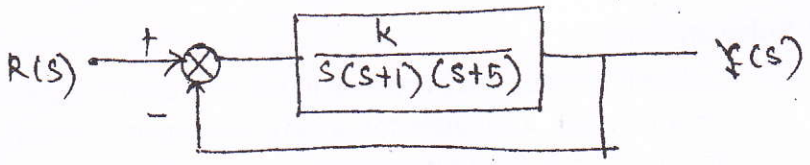
ii) $s^3 + 6s^2 + 12s + 8 = 0$

SECTION-II

Q4) Solve any two [2 × 9 = 18]

a) Differentiate between time response and frequency response.

b) Use bode plot to determine stability of the system when k = 10 for the following closed loop system.



c) Sketch Nyquist plot comment on stability for

$$G(s) = \frac{60}{(S^2+2S+5)(S+4)}$$

Q5) Solve any two [2 × 8 = 16]

a) Obtain state model of linear system.

b) Derive equation for transfer function from state variable model for continuous time system

c) Obtain state model for the system $\frac{Y(S)}{U(S)} = \frac{3S+4}{S^2+5S+6}$

Q6) Solve any two [2 × 8 = 16]

a) Draw polar plot for system with $G(S).H(S) = \frac{10}{S(S+2)}$

b) Write short note on PID controller.

c) Explain about stability using polar plots, properties and disadvantages of polar plot.