iE, sem IV, Electronics, CBGS, SH2018   10/12/18

(Old)

Time : 3 Hour   Marks: 80
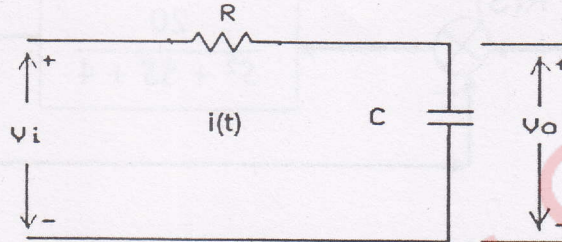
Note: Question No. 1 Compulsory.

Q.1   Attempt any four questions:-   (20)
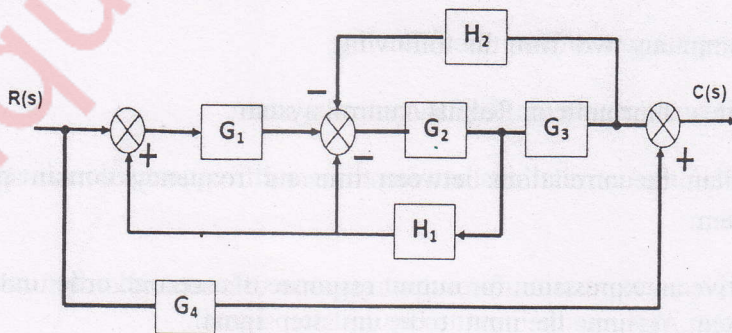a)   Define open loop system and explain with one example.   (5)

b)   Find the Transfer functions of Electrical networks shown in figure   (5)

c)   Explain Mason's gain formula   (5)

d)   Explain Controllability and Observability with its necessity condition for
        stability.   (5)

e)   Draw the time response for following pole locations.   (5)
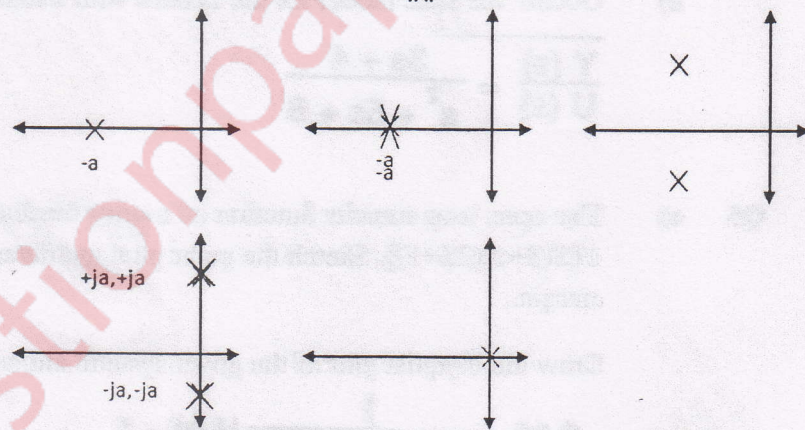
Q.2   a)   Obtain C(s)/R(s) using block diagram reduction rules.

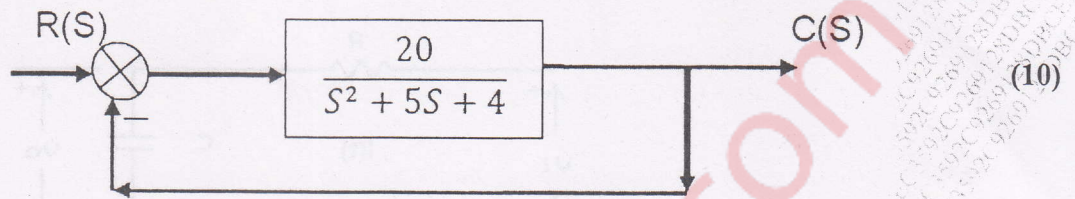

                                                                          (10)

        b)   Sketch the root locus for G(s)H(s)= K / S(S+4)(S²+4S+10)   (10)

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Q.3 a) Draw Bode plot and find gain margin and phase margin for

$$G(s)H(s) = \frac{64(S+2)}{S(S+0.5)(S^2+3.2S+64)}$$

(10)

b) For a system shown in fig. with unity feedback, find time domain specifications when a step input is applied

(10)

Q4 a) Find Transfer function of

$$\begin{vmatrix} \dot{x}_1 \\ \dot{x}_2 \end{vmatrix} = \begin{bmatrix} -5 & -1 \\ 3 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 2 \\ 5 \end{bmatrix} r(t) \; ; \; y = [1, 2]\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

(10)

b) Obtain the state model for the system with transfer function

$$\frac{Y(s)}{U(s)} = \frac{3s+4}{s^2+5s+6}$$

(10)

Q5 a) The open loop transfer function of a unity feedback system is given by G(s)= 1/[S(S+1)(2S+1)]. Sketch the polar plot and determine the gain margin and phase margin.

(10)

Draw the Nyquist plot of the given system and comment on the stability.

b) $$G(s) = \frac{1}{s(s+4)(s+8)} \; ; H(s) = 1$$

(10,

Q6 Attempt any two from the following

(20)

a) Write a short note on Robust control system

(10)

b) Explain the correlations between time and frequency domain specifications of the system

(10)

c) Derive an expression for output response of a second order under damped control system. Assume the input to be unit step signal.

(10)

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