Seat No.	

SV - 450

Total No. of Pages : 3

T. E. (Electronics and Telecommunication) (Semester -V) Examination, April - 2018
CONTROL SYSTEMS (Revised)
Sub. Code : 66315

Day and Date : Wednesday, 25 - 04 - 2018

Total Marks : 100

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

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

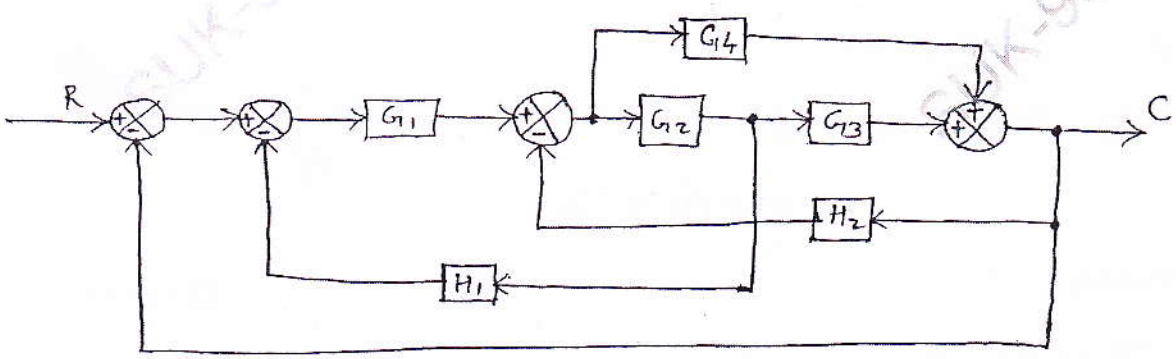
SECTION- I

Q1) Solve any two: **[2×9=18]**

a) Write mathematical model of mass, spring and damper element.

b) Compare open loop and closed loop system.

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



Q2) Solve any two **[2×8=16]**

a) Derive the relations for rise time, peak time, delay time and peak overshoot.

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

Find gain K with damping ratio of 0.5 and then determine t_s, M_p, t_p.

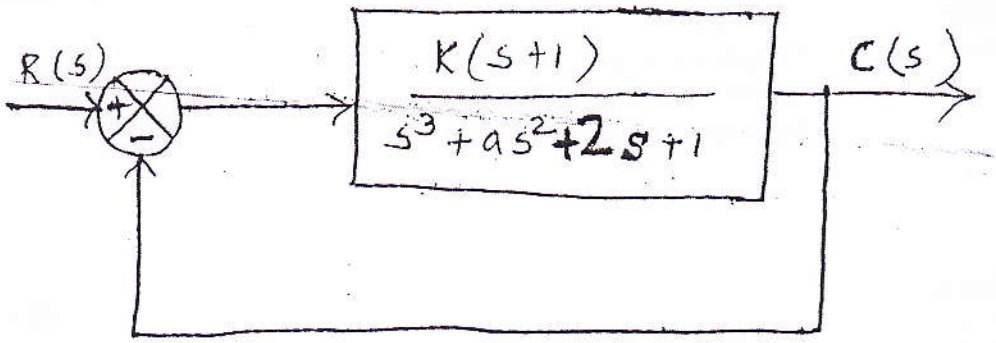
c) Derive expression for time response of first order system.

P.T.O.

Q3) Solve any two **[2×8=16]**

a) Explain limitations of Routh array.

b) A system oscillates with frequency ω, if it has poles at s = ±jω and no poles in R.H.S plane. Determine values of K and 'a', so that system shown in fig oscillates at a frequency 2 rad/sec.



c) By means of routh criterion determine stability of the systems represented by following characteristic equations. For unstable system determine the number of roots in right half S-plane.

i) $s^4+2s^3+8s^2+4s+3=0$

ii) $s^4+2s^3+s^2+4s+2=0$

SECTION - II

Q4) Solve any two: **[2×9=18]**

a) State and explain Nyquist stability criteria with suitable example.

b) State and explain various frequency domain specifications.

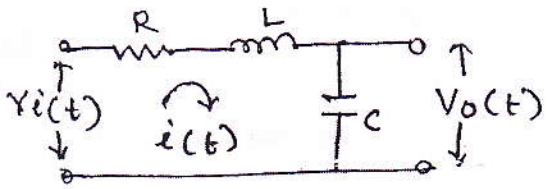
c) Sketch bode plot and determine gain crossover and phase crossover frequency for the system with unity feedback for following forward path transfer function $G(s).H(s)=\frac{100(S+3)}{S(S+1)(S+5)}$

Q5) Solve any two: [2×8=16]

a) Give state variable representation of control system.

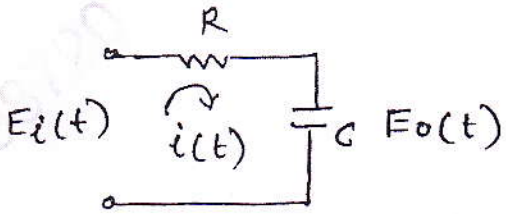
b) Explain the terms state, state variable, state vector and state space of the system.

c) Obtain state model for the given RLC circuit.



Q6) Solve any two [2×8=16]

a) Explain lead compensator with advantages and limitations

b) Write short note on PID controller

c) Consider following RC circuit and draw polar plot.