Code: 13A02402 **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

CONTROL SYSTEMS ENGINEERING

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

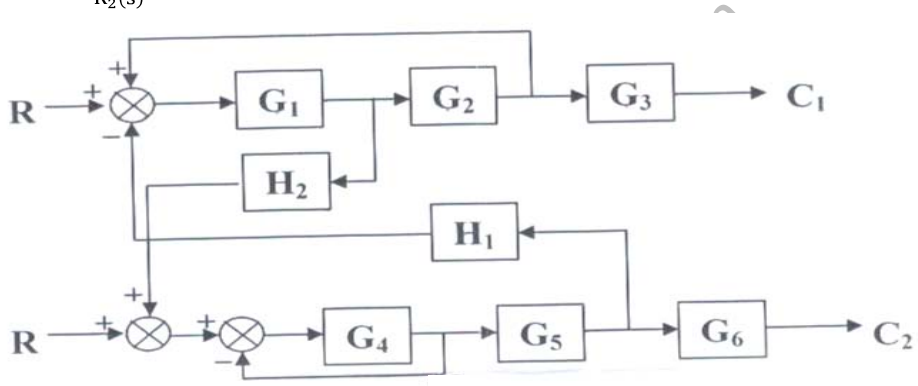
(a) Discuss advantages of closed loop system over open loop system.
(b) What is the displacement equivalence in the electrical system?
(c) How a control system is classified depending on the value of damping?
(d) Why derivative controller is not used in control system?
(e) Compare minimum phase function & non minimum phase function.
(f) State the rule for obtaining the breakaway point in root locus.
(g) State the properties of lead compensator.
(h) Define corner frequency in frequency response.
(i) Write the properties of state transition matrix.
(j) Discuss the significance of state Space Analysis.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 Find TF, $\frac{C_1(s)}{R_2(s)}$ of the block diagram shown below.



OR

3 Derive the transfer function for A.C servomotor.

UNIT – II

4 A unity feedback system is $G(s) = \frac{20\,(s+2)}{s(s+3)\,(s+4)}$. (i) Find the static error constants. (ii) Find the steady state error for $r(t) = 3u(t) + 5tu(t)$.

OR

5 Evaluate the time response of a system subjected to a unit step input $c(t) = 1 + 0.2e^{-60t} - 1.2e^{-10t}$. Obtain the expressions for the closed loop transfer function? Also determine the un-damped natural frequency and damping ratio of the system.

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UNIT – III

6 Check whether the points $s = -3 + j5$ lies on the root locus of the $G(s)H(s) = \frac{k}{s(s+1)(s+5)}$ system. Determine the corresponding value of k.

OR

7 Sketch the root locus plot for a unity feedback system with an open loop transfer function $G(s) = \frac{k}{s(s+3)(s+4)}$. Determine the value of K so that the dominant pair of complex poles of the system has a damping ratio of 0.5

UNIT – IV

8 Sketch the Bode plots for a system $G(s) = \frac{15(s+5)}{s(s^2+16s+100)}$ and discuss its stability.

OR

9 Use Nyquest criteria to find the stability of system $G(s) = \frac{1}{s^2(1+s)}$ and H(s) = 1 + 2s.

UNIT – V

10 Obtain the state variable representation of an armature controlled D.C Servomotor

OR

11 The dynamic behaviour of the system is described by $\frac{dc(t)}{dt} + 10c(t) = 40e(t)$, where 'e(t)' is the input and 'c(t)' is the output. Determine the transfer function of the system.

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