

Name : .....

Reg. No: .....

## SIXTH SEMESTER B.TECH (ENGINEERING) DEGREE EXAMINATION, APRIL 2013

## Electronics and communication engineering

## EC 2K 601 - CONTROL SYSTEMS



Time : Three Hours

Maximum : 100 Marks

Answer all questions.

## Part A

- I (a) Draw the block diagram of lag-lead compensator and explain.  
 (b) Explain the applications of DC servomotors.  
 (c) Explain Jury's criterion for stability analysis.  
 (d) What are the properties of state transition matrix?  
 (e) Distinguish phase margin and gain margin.  
 (f) Explain about sample and hold circuit.  
 (g) Draw the characteristics of Ideal and practical low pass RC filter. Explain them.  
 (h) What are state variable methods?

(8 x 5 = 40 Marks)

## Part B

- II. (a) (i) State and derive the properties of Laplace transform.  
 (ii) What is meant by modelling of continuous time systems.  
 (Or)  
 (b) Explain the significance of signal flow graphs. With an example show the application of signal flow graph technique.
- III. (a) (i) Using Routh-Hurwitz criterion determine the relation between K and T so that unity feedback control system whose open loop transfer function given below is stable

$$G(s) = \frac{K}{S[s(s+10)+T]} \quad (10 \text{ Marks})$$

- (ii) Determine the modified relation between K and T if all the roots of characteristic equation as determined in (i) are to lie to the left of the line  $S = -1$  in S-plane.  
 (5 Marks)

(Or)

- (b) Sketch the root locus diagram of the following open-loop transfer function:

$$G(s)H(s) = \frac{K}{s(s+2)(s+5)} \quad (15 \text{ Marks})$$

- IV (a) Find the solution of the difference equation given below for unit step sequence input:

$$y(n) + 3y(n-1) + 2y(n-2) = x(n-1) + 2x(n-2).$$

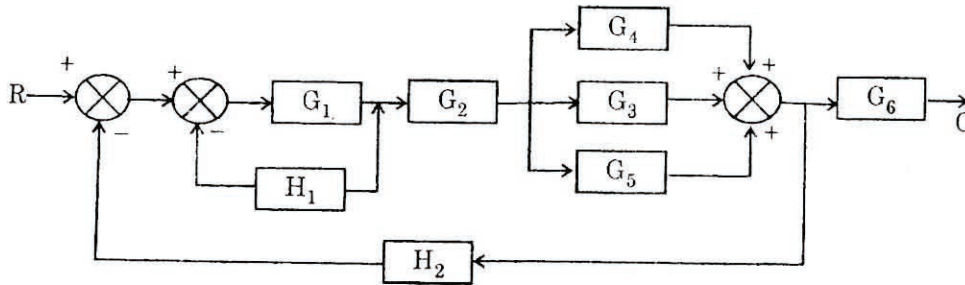
(Or)

Turn over

- (b) Check the stability of the system having the following characteristic equation using Routh-Hurwitz criterion.

$$s^5 + 2s^4 + 24s^3 + 48s^2 - 25s - 50 = 0.$$

- V (a) Obtain signal flow graph representation for a system whose block diagram is given below and using Mason's gain formula determine the ratio  $C/R$ .



(Or)

- (b) (i) Explain the application of d.c. servometer for speed control system. (8 Marks)  
(ii) Explain the significance of poles, zeros and order of the system. (7 Marks)

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