Total No. of Questions : 8] *[Total No. of Printed Pages : 3*

Roll No .....

EE/EX-4004 (CBGS)

B.E. IV Semester

Examination, May 2018

Choice Based Grading System (CBGS)

Control Systems

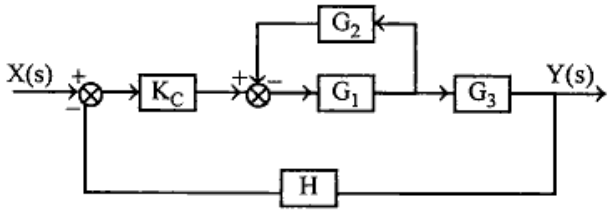
Time : Three Hours

Maximum Marks : 70

Note: i) Total number of questions are eight.
ii) Attempt any five questions.
iii) All questions carry equal marks.

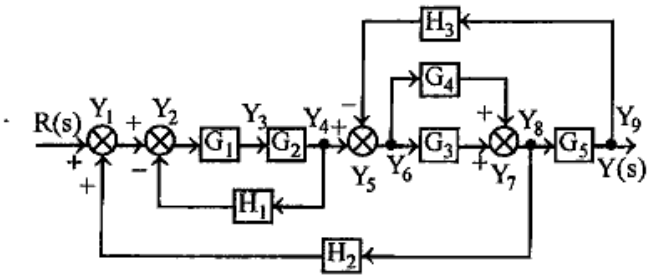
1. a) What is a control system? What are open and closed loop control systems? Enlist some applications in control systems? rgpvonline.com 6

   b) Determine the overall transfer function of the following closed loop control systems. 8



2. a) What is a mason gain formula? Explain each component of the formula and mention its advantages over block diagram reduction technique. 6

   b) Draw the following block diagram into its equivalent signal flow graph. 8



3. a) Explain time response of first order system to unit step and unit ramp input and also. Find the steady state error response for both. 8

   b) What is effect of addition of poles and zeros to closed loop system? 6

4. a) What do you understand by Lead-lag compensation? 8

   b) What is proportional plus derivative control? 6

5. a) Derive the transfer function of Armature controlled DC servo motor using mathematical modeling. 8

   b) What is the correlation between the transient response and frequency response. 6

6. Construct Routh array and determine the stability of the system hose characteristic equation is

$s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$. Also determine the number of roots lying on the right half side s-plane, left half side of s-plane and on imaginary axis. 14

7. a) What you understand by state variable. 3

   b) What is transition matrix. Mention its properties. 4

   c) Discuss relation between state equation and transfer function. 3

   d) Discuss concept of controllability and observability with examples. 4

8. a) Determine whether the system controllability or not 8

$$\dot{x} = \begin{bmatrix} -3 & 1 & 1 \\ -1 & 0 & 1 \\ 0 & 0 & 1 \end{bmatrix} x + \begin{bmatrix} 0 & 1 \\ 0 & 0 \\ 2 & 1 \end{bmatrix} u$$

   b) Find the eigen values for given matrix: 6

$$A = \begin{bmatrix} 2 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix}$$

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