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

Roll No .....

EI/IC-605 (GS)

B.E. VI Semester

Examination, May 2018

Grading System (GS)

Control Systems

Time : Three Hours

Maximum Marks : 70

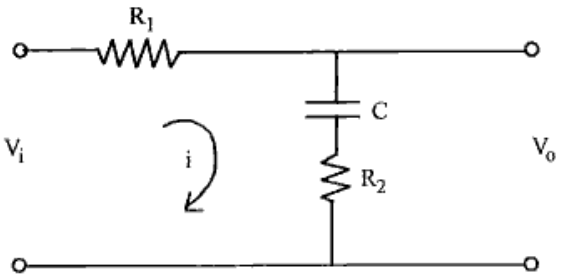
Note: i) Total number of questions are Eight.

ii) Attempt any five questions.

iii) All questions carry equal marks.

1. a) What is open-loop and closed-loop system? Explain with block diagrams. 7

   b) Determine the transfer function of the following network. 7



2. a) Write a short note on digital control. 6

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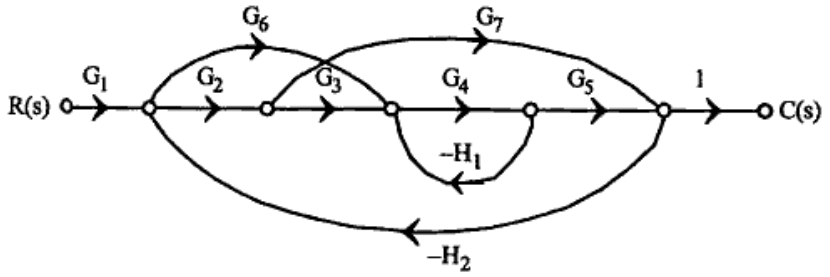
   b) Obtain the expression of C(s)/R(s) using Mason's gain formula for the signal flow graph given in figure. 8



3. a) Discuss how a.c servomotor is different from the conventional a.c. motor? Describe the operation and derive the transfer function of a.c servomotor. Draw its characteristics. 7

   b) Describe how synchros are used for position control and error detection. 7

4. a) Write short note on Sensitivity of control system with parameter variation. 7

   b) Define steady state error. Also derive the expression for steady state error for a closed loop unity feedback system. 7

5. Sketch the complete root locus of system having: 14

$$G(s)H(s) = \frac{K}{s(s+1)(s+2)(s+3)}$$

Find the range of K, over which the system is stable.

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6. Sketch Bode plot for the transfer function: 14

$$G(s)H(s)=\frac{1000}{s(1+0.1s)(1+0.001s)}$$

Determine the:

i) Gain cross over frequency
ii) Phase cross over frequency
iii) GM and PM
iv) Stability of the system

7. a) Describe the effect of addition of poles and zeros to the open-loop transfer function. 7

b) Explain controllability of the system. Determine the controllability of the system described by: 7

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}1 & 1\\ -2 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

8. Write short notes on any two of the following: 7 each

a) SIMULINK
b) State variable techniques
c) Test input signals

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