BACHELOR OF TECHNOLOGY (C.B.C.S.) (2020 COURSE)
B.Tech.Sem - IV E & TC :SUMMER- 2022
SUBJECT : CONTROL SYSTEMS & APPLICATION

Day : Tuesday
Date : 14-06-2022

S-24660-2022

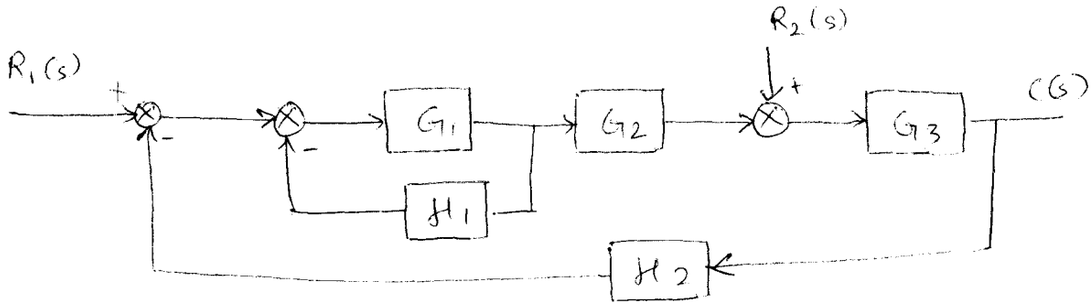
Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.

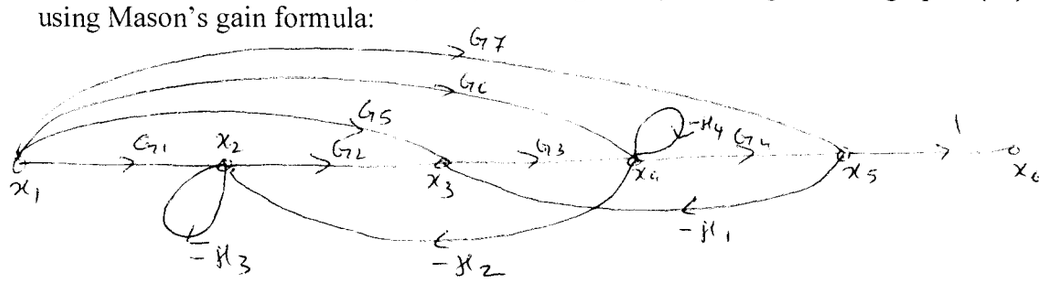
Q.1 **a)** Describe the digital control system. **(04)**

b) Obtain the transfer function of the given system using block reduction technique: **(06)**



OR

Obtain the transfer function C(s)/R(s), of the given system signal flow graph using Mason's gain formula: **(10)**



Q.2 Determine the root locus of the system whose open loop transfer function is **(10)**

$$G(s)H(S) = \frac{k}{s(s+4)(s+5)(s+6)}$$

OR

Derive and sketch the response of unit step signal to second order system. **(10)**

Q.3 **a)** Explain the effects of addition of poles and zeros on the stability of the system. **(06)**
b) Write the note on Proportional Integral controller.

OR

Explain ladder diagram in detail. **(10)**

Q.4 Sketch the Nyquist plot for the system whose open loop transfer is given as : **(10)**

$$G(s) = \frac{5(s-1)}{s(s+2)(s+3)}$$

OR

The open loop transfer function of an unity feedback system is given as: **(10)**

$$G(s) = \frac{10(s+2)}{s(s+5)(s+15)}$$

Draw the Bode plot and find the gain margin and phase margin.

Q.5 State and explain the rules of root locus in digital control systems. **(10)**

OR

For the given digital control system, draw the Bode plot of the given transfer function: $G(z)H(z) = \frac{z+1}{(z+5)(z+10)}$. **(10)**

OR

Q.6 a) Obtain the relation between state variables, inputs and outputs of the system in digital control system. **(08)**

b) State the test of controllability. **(02)**

OR

Comment if the system is controllable and observable or not: **(10)**

$$\begin{bmatrix} \dot{x}1 \\ \dot{x}2 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 1 & 3 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \text{ and } Y(t) = [1 \quad -2] \begin{bmatrix} x1 \\ x2 \end{bmatrix}$$

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