

Code: 9A02503

B.Tech III Year I Semester (R09) Supplementary Examinations June 2016

CONTROL SYSTEMS

(Common to EEE, ECE, E.con.E, EIE & MCT)

Time: 3 hours

Max Marks: 70

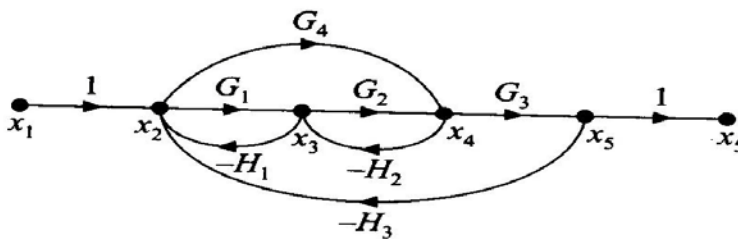
Answer any FIVE questions

All questions carry equal marks

(Polar graph may be issued)

- 1 By means of relevant diagrams, explain the working principles of a open loop and closed loop control systems.

- 2 Find the transfer function $\frac{x_5}{x_1}$, for the system whose signal flow graph is shown in figure below.



- 3 (a) What is meant by time response? Explain about: (i) Steady-state response. (ii) Transient response.
(b) Obtain the response of unity feedback system whose open loop transfer function is: $G(s) = 4/s(s+1)$ when the input is unit step.
- 4 Sketch the root locus for the unity feedback system whose open loop transfer function is:
 $G(s)H(s) = K(s^2 + 6s + 25)/[s(s+1)(s+2)]$
- 5 (a) Define the following terms:
(i) Resonant peak. (ii) Resonant frequency. (iii) Band width. (iv) Cut off rate.
(b) Draw the Bode Phase plot for the system having the following transfer function:
 $G(s) = 2000(s+1)/[s(s+10)(s+40)]$
- 6 Sketch the polar plot for following transfer function and from the plot determine the phase margin and gain margin:
 $G(s) = [(1+0.2s)(1+0.025s)]/[s^3(1+0.005s)(1+0.001s)]$
- 7 Explain the different steps to be followed for the design of a lag compensator with Bode plot?
- 8 Diagonalize the following system matrix.

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix}$$
