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B.E DEGREE END SEMESTER EXAMINATIONS, MAY 2012

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IV SEMETER- REGULATIONS 2008

EC9254-CONTROL SYSTEMS

Time : 3Hr Marks : 100

Answer ALL questions

PART – A **(10 x 2 = 20 Marks)**

1. Comment the stability of the open loop and closed loop system.
2. Write the analogous electrical elements in force – current analogy for the elements of mechanical translational system.
3. The closed loop transfer function of second order system is $\frac{C(s)}{R(s)} = \frac{10}{(s^2+6s+10)}$. What is the type of damping in the system.
4. A unity feedback control system has a open loop transfer function of $G(s) = \frac{20(s+5)}{s(s+0.1)(s+3)}$. Determine the steady state error for parabolic input.
5. Define Gain Margin and state it's important.
6. What is the difference between accurate and exact bode plot.
7. Comment about the stability of the system with respect to the location of its roots.
8. Discuss the stability of the following transfer function $M(s) = \frac{A}{s-a+jb} + \frac{A^*}{s-a-jb}$.
9. What is the state. state variable and state vector?
10. Write the state model of n^{th} order system.

PART – B **(5 x 16 = 80 Marks)**

11. i). Obtain the state model of the electrical network shown in fig 11.1 by choosing $v_1(t)$ and $v_2(t)$ as state variables.

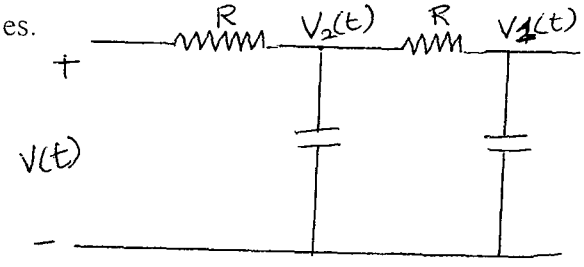

Fig 11.1

ii). Consider the system defined by

$$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\\ \dot{x}_3\end{bmatrix} = \begin{bmatrix}-1 & -2 & -2\\ 0 & -1 & 1\\ 1 & 0 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix} + \begin{bmatrix}2\\ 0\\ 1\end{bmatrix}u$$

$$y = [1 \quad 1 \quad 0]\begin{bmatrix}x_1\\ x_2\\ x_3\end{bmatrix}$$

Determine whether the system is completely controllable and Observable.