IC 8451 Control Systems

Important 13mark questions

Unit I

1. Define transfer function and derive the transfer function at field-controlled DC servomotor.
2. Explain in detail about the various elements of closed loop control system with an example.

Unit II

1. Derive the expression for rise time and peak time of a second order under damped system due to unit step input.
2. A unity feedback control system has an open loop transfer function G(s) = $\frac{K(s+9)}{s(s^2+4s+11)}$. Sketch the Root Locus.

Unit III

1. Sketch the polar plot for the following open loop transfer function and determine the gain margin and phase margin G(s) = $\frac{1}{(1+s)(1+2s)}$.
2. Sketch the Bode plot for the transfer function of a system represented by G(s) = $\frac{100}{s(s+1)(s+2)}$ and determine (i) Gain Margin (ii) Phase Margin and closed loop stability.

Unit IV

1. From the first principles explain how do you obtain the stability of a linear system using Nyquist criterion?
2. Specify the stability of the system whose characteristics equations is given by $s^7 + 9s^6 + 24s^5 + 24s^3 + 24s^2 + 23s + 15 = 0$.

Unit V

1. Explain the concepts of controllability and observability.
2. Obtain the complete solution of nonhomogeneous state equation using time domain method