Unit 3 Control System

Assignment

1) Define stability of a linear system for bounded input and bounded output system.
2) Write short notes on: (A) Absolute Stability; (B) Relative Stability; (C) Asymptotic Stability; (D) Conditional Stability
3) Give the necessary condition for Routh-Hurwitz criteria.
4) Examine the all poles and stability of the system having characteristic equation $s^5+s^4+3s^3+2s^2+4s+8=0$.Also state Routh's stability criteria.
5) Determine the range of values of 'K' such that the characteristics equation: $s^3+3(K+1)s^2+(7K+5)s+(4K+7)=0$, has roots more negative than s=-1.
6) Examine the all poles and stability of the system having characteristic equation $s^5+4s^4+8s^3+8s^2+7s+4=0$
7) Discuss the effect of location of poles on stability.
8) Define root locus. Find the root locus of G(s)=$\frac{K}{s(s+6)(s+8)}$
9) Find the root locus for complex poles G(s)=$\frac{K(s+9)}{s(s^2+4s+11)}$
10) Write short notes with formula on:
    (i) Resonant Peak (Mr) (ii) Resonant Frequency (ω_r) (iii) bandwidth (ω_b) (iv) cut-off frequency (v) cut-off rate

    OR

    What are the frequency domain specifications?
11) For unity feedback system G(s)= $\frac{100}{s(s+6)}$; determine : (A) Resonance peak (Mr) , (B) Resonance frequency (ω_r)
12) Discuss the effect of adding zero and pole to the forward path of a control system.
13) Write short notes on (A) Polar plot (B) Nyquist criterion. Draw Nyquist contour and explain it. (C) Phase margin and Gain margin (D) Bode Plot
14) Draw a polar plot of the following transfer function
    (a) G(s)= $\frac{1}{(1+sT)}$ (b) G(s)= $\frac{1}{s(1+sT)}$ (c) G(s)= $\frac{1}{s(1+sT1)(1+ST2)}$ (d) G(s)= $\frac{1}{(1+sT1)(1+ST2)}$
15) Draw a nyquist plot of the following transfer function

(a) G(s)= $\frac{10}{s(1+s)}$ (b) G(s)= $\frac{1}{s^2(1+s)(1+2s)}$

16) Draw a Bode plot of the following transfer function
    G(s)= $\frac{80}{s(2+s)(20+s)}$