

Enrolment No. _____

- Q.3 (a) What do you understand by steady state analysis and steady state error? Explain the effect of input on steady state error. 07
- (b) A unity feedback system has $G(s) = 40(s+2) / s(s+1)(s+4)$. Determine (i) Type of the system, (ii) All error coefficient and (iii) Error for ramp input with magnitude 4. 07

OR

- Q.3 (a) Derive a equation of unit step response of a second order system for an underdamped case. 07
- (b) A second order system is given by $C(s) / R(s) = 25 / s^2 + 6s + 25$. Find its rise time, peak time, peak overshoot and settling time if subjected to unit step input. Also calculate expression for its output response. 07

- Q.4 (a) $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$, check the stability of the given characteristic equation using Routh's method. 07
- (b) The characteristics equation of feedback control system is $s^4 + 20s^3 + 15s^2 + 2s + K = 0$ 07
- (i) Determine range of K for system stability. (ii) Can the system be marginally stable? If so, find the required value of K and frequency of sustained oscillations.

OR

- Q.4 (a) Sketch the bode plot for the system having $G(s)H(s) = 20 / s(1+0.1s)$ 07
- (b) Enlist and explain the different standard test inputs signal. 07

- Q.5 (a) Open loop transfer function of a system is given by $G(s)H(s) = K / s(s+2)(s+10)$. Sketch the Nyquist plot and hence calculate the range of values of K for stability. 07
- (b) Sketch the Nyquist plot of a given transfer function, $G(s)H(s) = 10 / s^2(s+2)$ 07

OR

- Q.5 (a) Sketch the root locus for the system having $G(s)H(s) = K / s(s^2 + 2s + 2)$ 07
- (b) Sketch the complete root locus of system having $G(s)H(s) = K / s(s+1)(s+2)(s+3)$ 07
