Time: Three Hours   2 2 NOV 2016   *Max.Marks:60*

"Verify the course code and check whether you have got the correct question paper"

Solve any five questions (5x12=60Marks)

Q.1 a) Use block diagram reduction to simplify the block diagram below in Fig: A into a single block relating Y (s) to R (s).
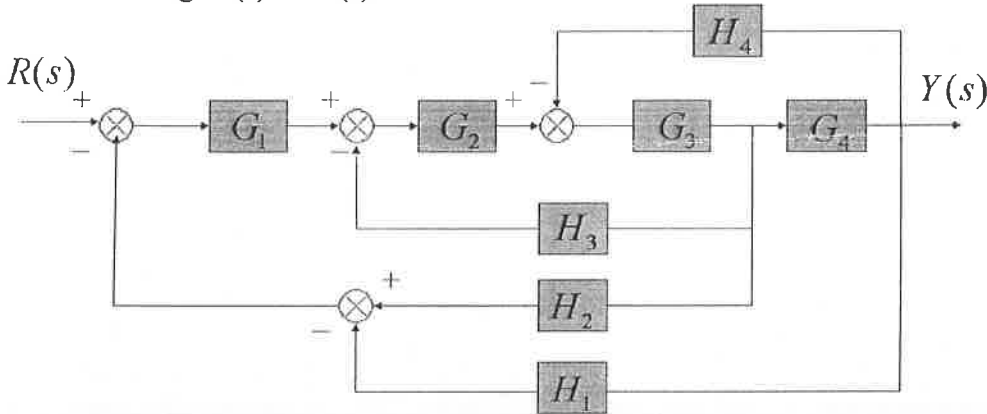

Fig: A

b) Define open-loop and closed loop control systems. Give one example of each. State the effects of feedback on control system performance.

Q.2a) Draw time response of standard second order system and explain time response specifications.

    b) Find the transfer function by Mason's gain formula for the system shown in Fig: B
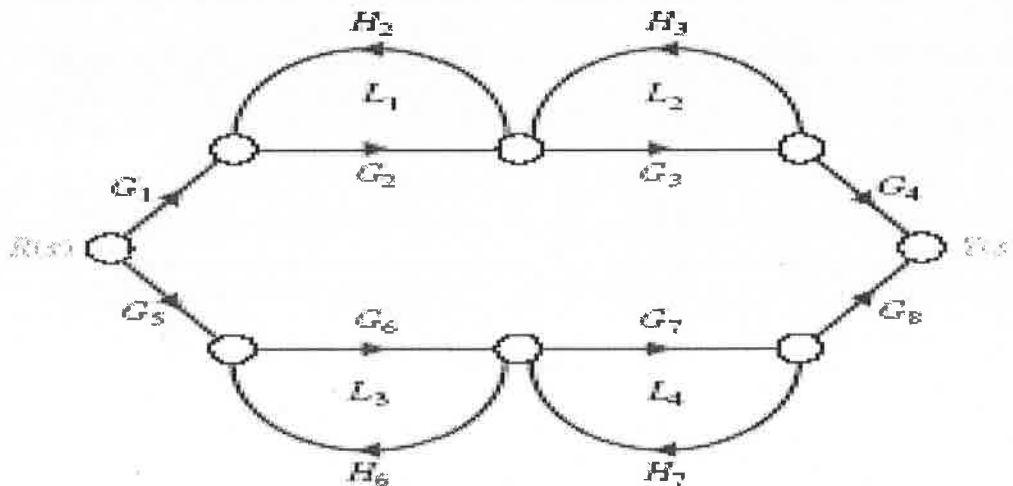

Fig: B

Q3a) What is type and order of system. Explain effect of type of system on steady state error.

b) Explain stability analysis using Routh Hurwitz criterion and test the system stability whose characteristic equation is: $s^5 + 2s^4 + 4s^3 + 8s^2 + 3s + 1 = 0$

Q4a) Sketch the root locus for

$$G(s)\,H(s) = \frac{K}{s\,(s+3)\,(s+5)} \quad (K>0)$$

Comment on stability of the system.

b) Explain for the determination of gain and phase margin of a system from bode plot.

Q5 a) A unity feedback system has

$$G(s) = \frac{180}{S(S+6)} \quad \text{and } r(t) = 4t$$

Determine (i) the steady-state and (ii) the value of K to reduce the error by 6%.

b) With the help of neat sketches, explain the construction and working principle of synchro transmitter and receiver.

Q.6 Write a short notes on any three

1) PI controller
2) D.C. tacho-generator
3) System sensitivity
4) Nyquist Plot