Tuesday, May 28, 2019 02:30 pm - 05:30 pm 1T00816 - T.E.(ELECTRICAL)(Sem VI) (CBSGS) / 36904 - CONTROL SYSTEM -I 68764

**(3 Hours)** **Total Marks: 80**

N.B : (1) Question No.**1** is compulsory.

(2) Attempt any **Three** from the remaining questions.

(3) Use **graph paper and semi log paper** wherever necessary.

Q.1 Attempt any **Four** 20

(a) Derive the expression to obtain transfer function from state model.

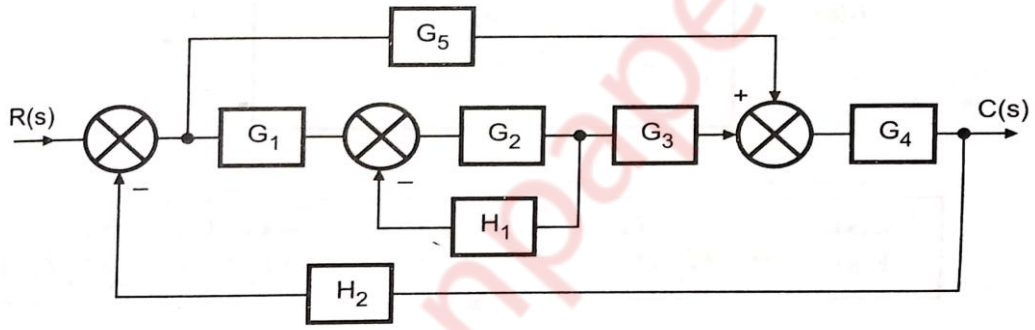
(b) Define 'Stability' , 'Unstability' , Marginal Stability' with respect to pole position.

(c) How to convert a system represented in state space to transfer function.

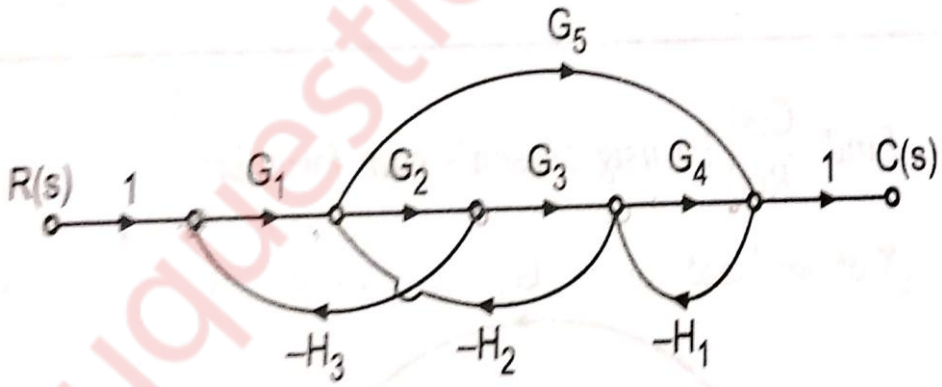
(d) Explain Nyquist criteria for stability.

(e) Explain the difference between open loop and closed loop systems.

Q.2 (a) Reduce the block diagram to a single block $T(S)=\frac{C(S)}{R(S)}$ 10

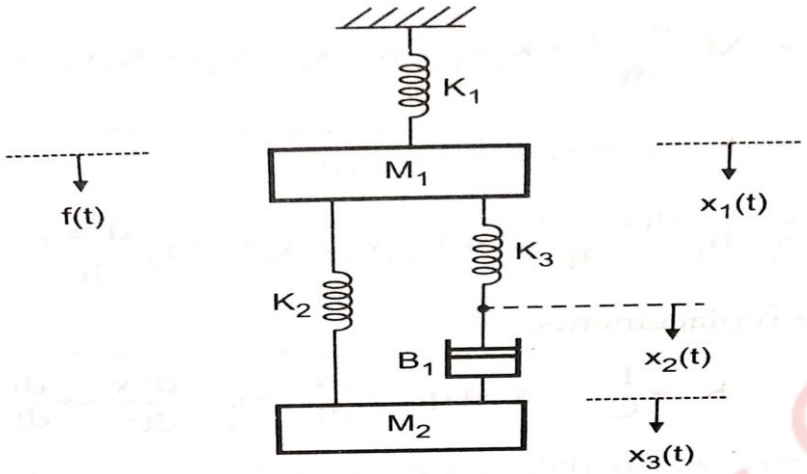



(b) Masson's gain formula to obtain the transfer function for the given figure 10




Q.3 (a) Find Kp, Kv, Ka and steady state error for a system with open loop transfer function as $G(S)H(S)=\frac{10(S+2)(S+3)}{S(S+1)(S+5)(S+4)}$. Where input is, $r(t)=3+t+t^2$. 10

(b) Draw the equivalent mechanical system of the given system. Hence write the set of equilibrium equation for it and obtain the force voltage analogy. 10



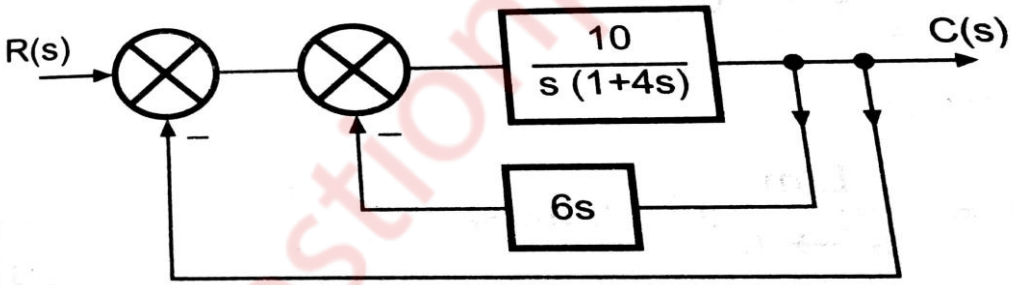

Q.4 (a) Given the unity feedback system that has the transfer function 10

$G(S) = \dfrac{K}{S(S+2)(S+4)(S+8)}$ Sketch the complete root locus.

(b) Using the routh table tell how many poles of the following equation are in the RHS, LHS & on the imaginary axis and also comment for stability 10

$S^8+5S^6+2S^4+3S^2+1=0$

Q.5 (a) For a given system find error coefficients and type of the system. 10




(b) Draw the bode log magnitude & phase angle plots for the system given by

$G(S)H(S) = \dfrac{80}{S(S+2)(S+20)}$ Find phase margin, gain margin, phase & gain crossover frequency .Also Comment on stability.

Q.6 (a) Sketch the Nyquist plot for a system with $G(S)H(S) = \frac{10(S+3)}{S(S-1)}$ 20

(b) Explain gain cross over frequency, phase cross over, gain margin and phase margin in frequency response technique.