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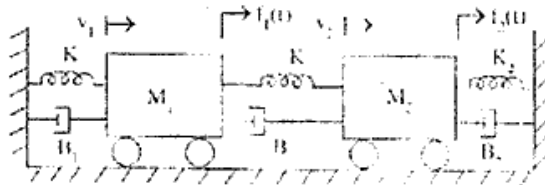
BT-5 / D-17
CONTROL SYSTEM ENGG.
Paper-ECE-307N

Time allowed : 3 hours] [Maximum marks : 75

Note :- Attempt five questions, selecting at least one question from each unit.

Unit-I

1. (a) Explain the open and closed loop control system with examples and list out the advantages of closed loop control system. 5
- (b) Write the differential equations governing the mechanical system shown in figure. Also draw the force- voltage and force-current analogous circuit. 10

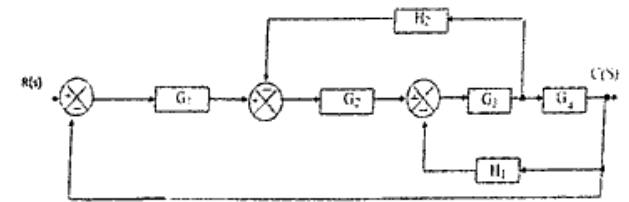


2. (a) Using block diagram reduction techniques obtain C/R by reducing the block diagram shown below. 10

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- (b) Derive the transfer function of a two phase A.C. Servomotors. 5

Unit-II

3. (a) Explain transient response specifications. 5
- (b) The open transfer function of a system with a unity feedback gain is given as $G(s) = \frac{20}{(s+5)(s+20)}$. Determine the damping ratio, maximum overshoot, rise time and peak time. Derive the used formula also. 10
4. (a) Describe steady state error and static error constants in unity feedback control system. 5
- (b) Explain the concept of stability and the necessary conditions for stability using Routh and Hurwitz criterion. 10

Unit-III

5. Construct the Nyquist plot for a system whose open loop transfer

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function is given by $G(s)H(s) = \frac{K(1+s)^2}{s^3}$. Find the range of K for stability. 15

6. Draw the Bode Plot for the control system having

$G(s) = \frac{K}{s(1+0.1s)(1+0.05s)}$. Find the value of K to have gain margin of 7db and phase margin of 18db. 15

Unit-IV

7. (a) Obtain the state variable representation of an armature controlled DC motor. 5

(b) Define Controllability and observability and Test Controllability of system given by following equation. 10

$$\dot{x}_1 = x_2 + u$$

$$\dot{x}_2 = -5x_1 - 4x_2 + 2u$$

8. Write short note on any three of following: 5×3=15

(a) Concept of state variables.

(b) State Models

(c) Feedback Compensation

(d) State Space Analysis.

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