Roll No. ..... Total Pages : 2

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BT-6/F-11

CONTROL SYSTEM ENGG.

Paper : ECE-302(E)

Time : Three Hours] [Maximum Marks : 100

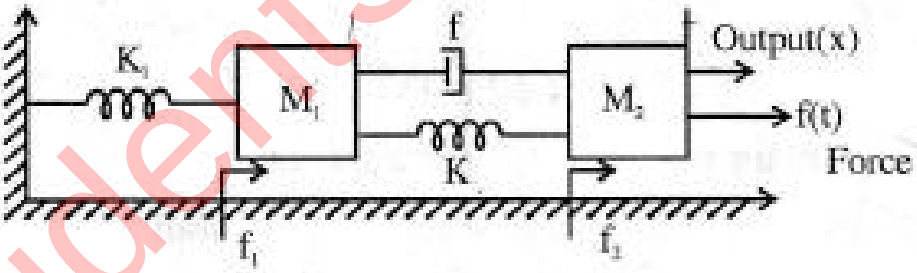
Note : Attempt *five* questions in all, selecting at least *one* question from each unit.

UNIT–I

1. (a) Explain Feedback characteristics of control system. 15

   (b) Explain Open loop and Closed loop system. 5

2. Obtain Transfer function of the following system : 20



UNIT–II

3. Response of a system for unit step input is given by

$$C(t) = 1 + .2e^{-60t} - 1.2e^{-10t}.$$

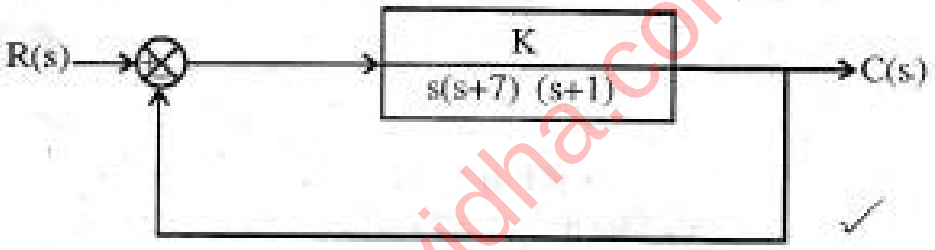
obtain

(a) Closed loop transfer function;

(b) Natural & Undamped natural frequency, and

(c) Damping ratio. 20

4. A unity feedback system is given by



Determine the value of K so that system is stable. 20

UNIT–III

5. Draw Root locus of system whose transfer function is

$$G(s)\,H(s) = \frac{K}{s(s+3)(s^2+2s+2)}$$ 20

6. (a) Explain Nyquist Stability criterion. 5

(b) Derive the relation between time and frequency response. 15

UNIT–IV

7. (a) Explain the need of compensation. 10

(b) Explain Controllability and Obeservability. 10

8. For the following state model, compute the state transition matrix and find state response :

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 2 \end{bmatrix} u;$$

$$\begin{bmatrix} x_1(0) \\ x_2(0) \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, \; u = \text{unit step.}$$ 20
