$31/5/19$ (m)

RE-24357

B. Tech. 6th Semester (ME)
Examination – May, 2019

AUTOMATIC CONTROL

Paper : ME-308-F

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is *compulsory*. Attempt *one* question from each Section. All questions carry equal marks.
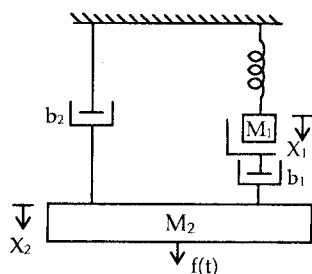
1. Explain the following :   5 × 4 = 20

   (a) Machine tool control and boiler control

   (b) Laplace transform

   (c) Nichols plots

   (d) Nyquists criterion

   (e) State vector differential equation

     P. T. O.

SECTION – A

2. Find transfer function : 20

$$\frac{X_1(S)}{F(S)} \text{ and } \frac{X_2(S)}{F(S)}$$

3. Explain hydraulic, pneumatic and electronic controllers. 20

SECTION – B

4. The transfer function of any system is given as : 20

$$\frac{C(S)}{R(S)} = \frac{1}{S^3 + 9S^2 + 26S + 24}$$

Find :

(i) Impulse response

(ii) Step response with magnitude 5 unit

5. Explain the following : 20

(a) Polar plots

(b) Rectangular plots

(c) Equivalent unity feedback system

SECTION – C

6. Find the time response of the system and predict its stability as time approaches infinity, for input $r(t) = \sin(t)$ 20

$$T(S) = \frac{1}{(S+1)(S^2+1)}$$

7. Find the break away point for root loci of the system whose open loop transfer function is : 20

$$U(S)H(S) = \frac{K(S+1)}{S(5S+6)}$$

SECTION – D

8. Find the z-transform of the system 20

$$X(S) = \frac{1}{S^2 + 2S + 2} \text{, where } T = 1 \text{ sec.}$$

9. What are state space equations ? Discuss in detail mathematically. Explain various methods of decomposition of transfer function. 20