

Roll No.

24357

**B. Tech 6th Semester (ME)
Examination – May, 2018**

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.

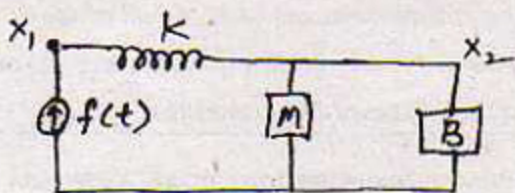
Note : Attempt *five* questions in all. Question No. 1 is *compulsory*. Answer other *four* questions, selecting *one* question from each Section. All questions carry equal marks.

1. (a) What is steady state error ? 5
- (b) What are the advantages of state space techniques ? 5
- (c) Define relative and absolute stability. 5

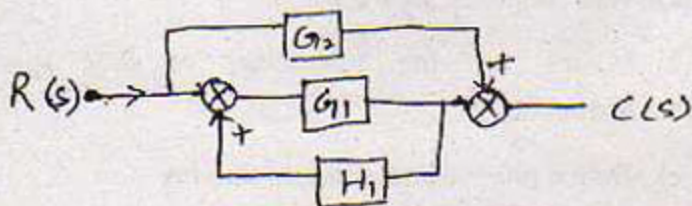
- (d) Name the *two* types of electrical analogies for the mechanical system. 5

SECTION - A

2. (a) Explain various types of control systems. 10
(b) Explain the operation of hydraulic controller. 10
3. (a) Derive the transfer function as shown in fig.: 10



- (b) Using block diagram reduction technique, calculate transfer function as shown in fig.: 10



SECTION - B

4. What are the time domain quantities which characterize a transient response ? Derive an expression for percentage overshoot of a second order.

20

5. Draw the root locus for a system whose open loop transfer function is given by :

20

$$G(s)H(s) = \frac{K}{s(s+4)(s^2+4s+20)}$$

SECTION - C

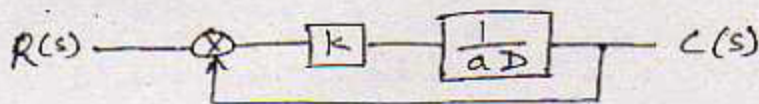
6. Determine the range of k for stability for the characteristic equation :

20

$$s^4 + ks^3 + s^2 + s + 1 = 0;$$

using Routh's criterion.

7. Draw polar plots of the following first order system : 20



SECTION - D

8. For the system with transfer function :

$$\frac{Y(s)}{U(s)} = \frac{s^2 + 2s + 1}{s^3 + 7s^2 + 14s + 8}$$

Derive the state space representation. 20

9. Explain hold device and pulse transfer function with suitable example. 20