

00311

B.TECH. IN ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

December, 2012

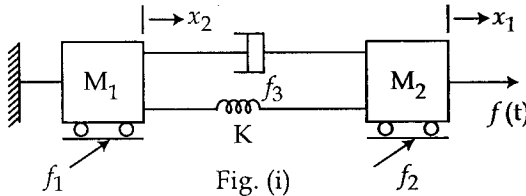
BIEL-020 : CONTROL ENGINEERING

Time : 3 hours

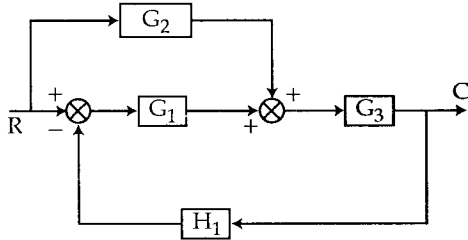
Maximum Marks : 70

- Note :** (i) Attempt *any seven* questions.
 (ii) All questions carry *equal* marks.
 (iii) Use of scientific calculator is permitted.

1. (a) On the basis of force-current analogy write the equations for the system given in fig. (i). 5



- (b) Reduce the block diagram shown in fig. (ii) to a single block representation. 5



2. Using Mason's gain formula determine the ratio C/R for the system shown in fig. (iii). 10

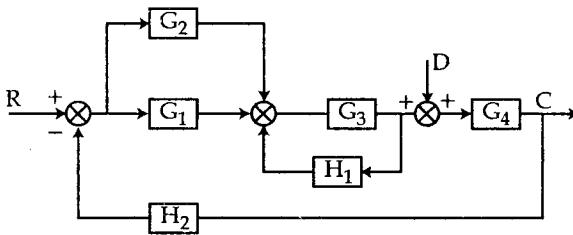


Fig. (iii)

3. A unity feed-back control system has its open- 10

loop transfer function given by $G(S) = \frac{4S+1}{4S^2}$.

Determine an expression for the time response when the system is subjected to unit impulse input function.

4. The overall transfer function of a control system 10

is given by $\frac{C(S)}{R(S)} = \frac{16}{S^2+1.6S+16}$, damping ratio

is 0.8. Determine rise time, peak time, maximum overshoot and steady state error for unit ramp input.

5. The open-loop transfer function of a unity feedback control system is given by **10**

$$G(S) = \frac{K}{S (ST_1+1) (ST_2+1)}.$$

Applying Routh-Hurwitz criterion determine the value of K in term of T_1 and T_2 for the system to be stable.

6. Examine the closed - loop stability of a system **10**
whose open - loop transfer function is given by

$$G(S) H(S) = \frac{50}{(S+1) (S+2)}.$$

7. Sketch the asymptotic Bode plot for the transfer **10**
function given below

$$G(S) H(S) = \frac{2 (S+0.25)}{S^2 (S+1) (S+0.5)}.$$
 From the Bode

plot determine.

- (a) the phase cross over frequency and
(b) the gain cross over frequency.
8. Describe Log-Lead compensator and state its **10**
applications.

9. (a) Obtain state equations for the differential equation given below. 5

$$\frac{d^2 y}{dt^2} + \frac{3 dy}{dt} + 4y = \frac{du}{dt} + 3u$$

- (b) Draw the state block diagram for the transfer function given below : 5

$$\frac{C(S)}{R(S)} = \frac{1}{(S+1)(S+3)}$$

10. Write short notes on *any two* of the following : 2x5=10

- (a) Open loop control system
- (b) Neural Network
- (c) PID controllers
