B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

June, 2013

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)   Obtain a mathematical model for the   5
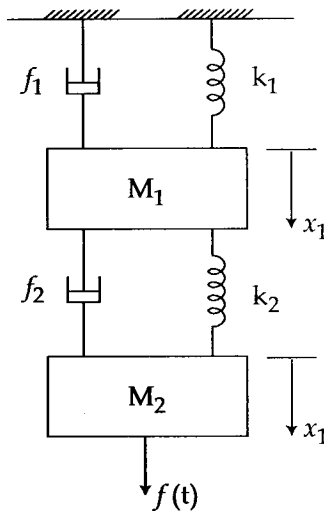mechanical system shown in Fig.(i)

Fig. (i)

(b) For the block diagram shown in Fig. (ii).   **5**
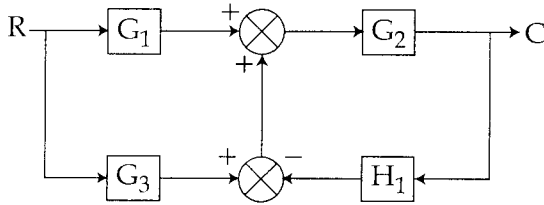Determine the overall transfer function.

Fig. (ii)

2.   Draw a signal flow graph for the system whose   **10**
block diagram is shown in Fig. (iii). Detemine the
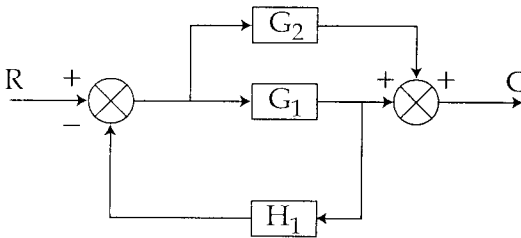overall transmittance.

Fig. (iii)

3.   The forward path transfer function of a unity   **10**
feed back control system is given by

$$G(S) = \frac{2}{S(S+3)}.$$

Obtain an expression for unit step response of the
system.

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4.   The open loop transfer function of a unity   **10**
     feed back control system is given by

$$G(S) = \frac{25}{S(S+5)}.$$

Calculate the natural frequency of oscillations, damped frequency of oscillations, damping factor, damping ratio and the maximum overshoot of a unit step input.

5.   Using Routh criterion investigate the stability of   **10**
     a unity feedback control system whose open - loop
     transfer function is given by

$$G(S) = \frac{e^{-ST}}{S(S+2)}.$$

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

$$G(S) H(S) = \frac{K}{S(ST+1)}.$$

7.   A unity feedback control system has an   **10**

open - loop transfer function $G(S) = \dfrac{K}{S(S+4)}.$

Draw the root locus and determine the value of K if the damping ratio s and is to be 0.707

8. Explain briefly the salient features of Root Locus   **10**
   Plot and the procedure for Plotting Root Locus.

9. Draw the state block diagram for the transfer   **10**
   function given below and obtain state equations

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

10. Write short notes on *any two* of the following.
                                                    2x5=10
    (a)   Closed loop control system

    (b)   Phase - Lag compensator

    (c)   PI controller

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