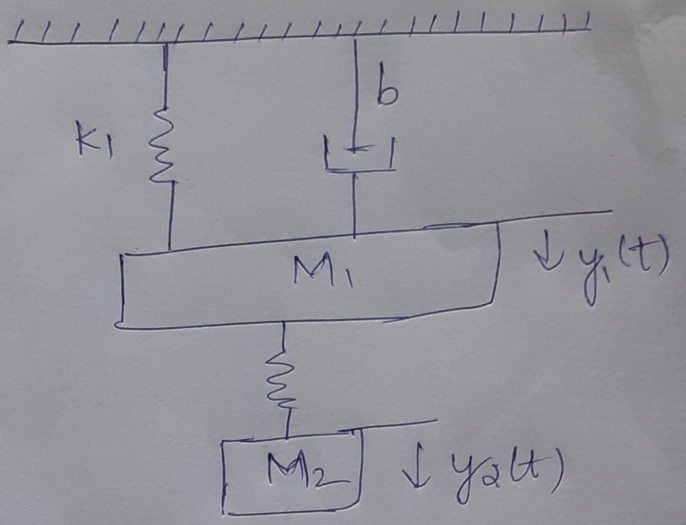
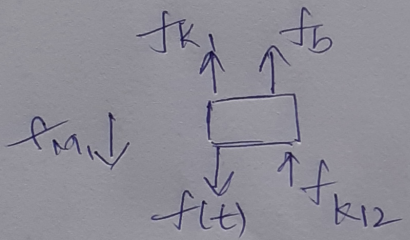
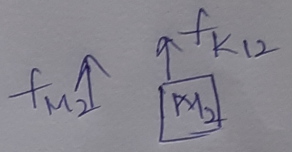
Q1)



Freebody diagram for M_1



FBD for M_2



$$f(t) - f_b - f_{K_1} - f_{K12} = M_1 a$$

also $f(t) = M_1 \ddot{y}_1 + K_1 y_1 + b\dot{y}_1 + K_{12}(y_1 - y_2)$

$$\therefore \ddot{y}_1 = \frac{1}{M_1}\left(f(t) - K_1 y_1 - b\dot{y}_1 - K_{12}(y_1 - y_2)\right)$$

eq $M_2 \ddot{y}_2 + K_{12}(y_2 - y_1) = 0$ From FBD2

$$\therefore \ddot{y}_2 = -\frac{K_{12}}{M_2}(y_2 - y_1) = \frac{K_{12}}{M_2}(y_1 - y_2)$$

Given $f(t) = 2 * \sin(10 * t)$

$M_1 = 100$, $K_1 = 50$, $b = 50$

M_2 & K_{12} are adjusted so M_1 doesn't vibrate.