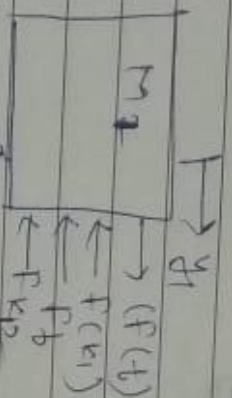


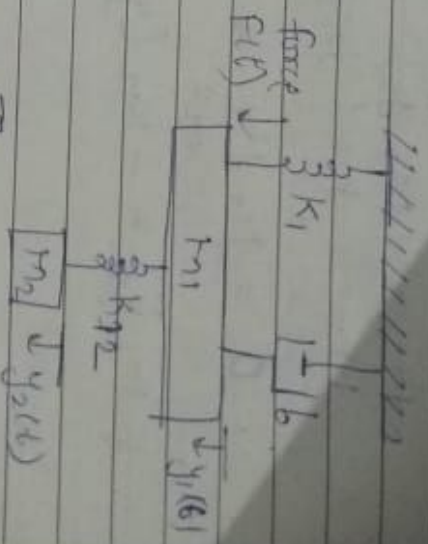
Week 1 - Problem 1

Solution:-

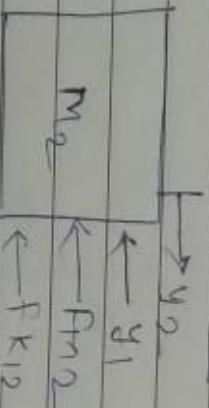
First draw free body diagram
for mass m_1 and m_2



[Force due to its own mass]



also, for mass m_2



diff. eqn for mass m_1 is

$$F_{m1} = m_1 \ddot{y}_1$$

$$F_b = B \dot{y}_1$$

$$F_{k1} = k_1 y_1$$

$$F_{k12} = k_{12} (y_1 - y_2)$$

$$F(t) = m_1 \ddot{y}_1 + B \dot{y}_1 + k_1 y_1 + k_{12} (y_1 - y_2)$$

$$\ddot{y}_1 = \ddot{y}_1 + B \dot{y}_1 + y_1 (k_1 + k_{12}) - k_{12} y_2$$

$$m_1 \ddot{y}_1 = F(t) - B \dot{y}_1 - y_1 (k_1 + k_{12}) + k_{12} y_2 \quad \text{--- (I)}$$

(I)

diff. eqn for mass m_2 is,

$$F_{m_2} = m_2 \ddot{y}_2$$

$$F_{k_{12}} = k_{12} (y_2 - y_1)$$

$$\therefore D = m_2 \frac{d^2 y}{dt^2} + k_{12} (y_2 - y_1) \quad \text{--- (ii)}$$

$$m_2 \ddot{y}_2 = -k_{12} (y_2 - y_1)$$