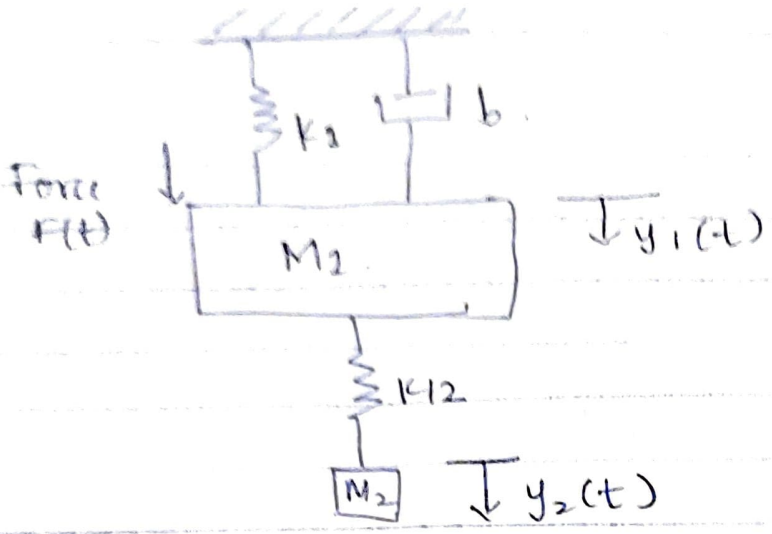
Week 1 - Problem 1

Name: Mihika. M

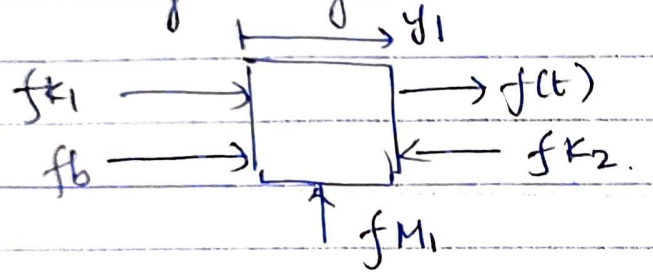
Unique ID: 2005119.

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

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



Free Body Diagram on M_1.



$$f_{M1} = M_1 \frac{d^2 y_1}{dt^2}$$

$$f_b = B \frac{dy_1}{dt}$$

$$f_{K1} = K_1 y_1$$

$$f_{K2} = K_2 (y_1 - y_2)$$

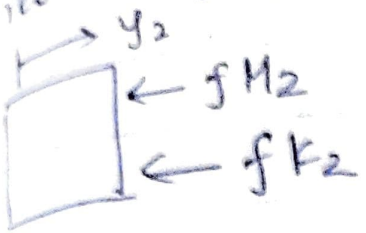
$$f(t) = M_1 \frac{d^2 y_1}{dt^2} + B \frac{dy_1}{dt} + K_1 y_1 + K_2 (y_1 - y_2)$$

Take L.S on Both sides.

$$F(s) = M_1 s^2 y_1(s) + B s y_1(s) + K_1 y_1(s) + K_2 (y_1(s) - y_2(s))$$

$$(s) = Y_1(s)\left[M_1 s^2 + B(s) + K_1 + K_2\right] - (K_2 Y_2(s))$$

Body for mass M2.



$$fM_2 = M_2 \frac{d^2 y_2}{dt^2}.$$

$$fK_2 = K_2 y_2.$$

$$0 = M_2 \frac{d^2 y_2}{dt^2} + K_2 y_2.$$

Take L.T on B.S.

$$0 = M_2 s^2 y_2(s) + K_2 y_2(s) - K_2 y_1(s).$$

$$0 = y_2(s)\left[M_2 s^2 + K_2\right] - K_2 y_1(s).$$