

**IQRA NATIONAL UNIVERSITY PESHAWER**



**ASSIGNMENT # 03**

**INTRODUCTION TO EARTHQUAKE  
ENGINEERING**

**B-tech(civil)**

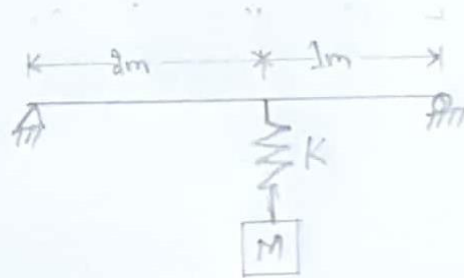
**6th semester**

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Determine the equivalent stiffness of system.



Given Data:-

$$E = 210 \times 10^9 \text{ N/m}^2$$

$$I = 5 \times 10^{-4} \text{ m}^4$$

$$K = 1 \times 10^8 \text{ N/m}$$

$$l = 3 \text{ m}$$

$$a = 2 \text{ m}$$

$$b = 1 \text{ m}$$

Solution:-

According to support of the system one roller and other is pinned.

~~$K_2 =$~~

$$K_2 = \frac{3EI}{a^2 b^2}$$

$$K_{eq} = \frac{k_1 \times k_2}{k_1 + k_2}$$

$$K_2 = \frac{3 \times (210 \times 10^9) \times (5 \times 10^{-4}) \times 3}{(2)^2 \times (1)^2}$$
$$= \frac{945,000,000}{4}$$

$$K_2 = 236,250,000 \text{ N/m}$$

$$K_2 = 2362.5 \times 10^5 \text{ N/m}$$

Equivalent stiffness of system:

$$k_{eq} = \frac{(1 \times 10^8) \times 2362.5 \times 10^5}{(1 \times 10^8) + 2362.5 \times 10^5}$$

$$k_{eq} = 7.03 \times 10^7 \text{ N/m}$$

