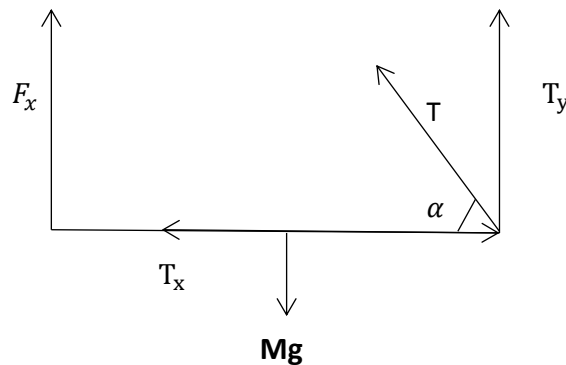


Answer on Question # 76567, Physics -Electric Circuits:

Question: A horizontal rod of mass 10 kg and length 12 m is hinged to a wall at one end and support end by a cable which makes an angle 30° with the rod at its other end. Calculate tension in the cable and force exerted by hinge.

Solution:



Here, $M = 10 \text{ kg}$ is the mass of the rod, $g = 9.8 \text{ m/sec}^2$ is the acceleration due to gravity, $L = 12 \text{ meter}$ is the length of the rod, T is the tension in the cable and $\alpha = 30^\circ$ is the angle which the cable makes with the rod.

Now, from the diagram we get,

$$Mg = 2T \sin \alpha$$

$$\text{Or, } T = \frac{Mg}{2 \sin \alpha} \dots\dots\dots(1)$$

Put the value of M , g and α in equation (1), we get,

$$T = 98 \text{ N}$$

Now, x- component of force is $a = T \cos \alpha = 85 \text{ N}$. [Put the value of T and α]

Again, y-component of force is $b = Mg - T \sin \alpha = 49 \text{ N}$ [Put the value of T , α , M and g]

So, total force $F = \sqrt{a^2 + b^2} = 98 \text{ N}$. [Put the value of a and b]

Answer: Tension is 98 N and force is 98 N.

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