Question#14603

An object of mass 5 kg is secured by a string and set to rotate round a vertical circular path of 2 m radius . when the object is at the lowest position its tangential speed is 6 m/s , calculate the tension in the string.

Solution:

Let:

$m = 5\ Kg$

$r = 2\ m$

$v = 6\ m/s$

$F - ?$

$F = mg + Ft, were\ Ft -$ centrifugal force

$$F = mg + m\omega^2 r, were\ \omega -$$ angular velocity

As: $v = \omega r;\ \omega = \frac{v}{r}$

$F = mg + m(\frac{v}{r})^2 r = mg + m\frac{v^2}{r}$

$F = 5 * 9.8 + 5 * \frac{6^2}{2} = 139\ N$

Answer: 139 N.