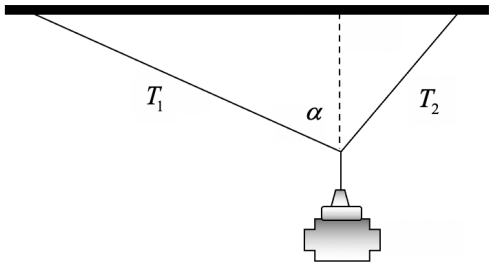
Question 28

An engine weighing 5 kg is suspended by two ropes at right angles to one another, which support tensions of T_1 and T_2 newtons. The rope supporting a tension of T_1 makes an angle of α to the vertical as shown in the diagram below.



Then

A. $T_1 = 5\sin(\alpha)$ and $T_2 = 5\cos(\alpha)$

B. $T_1 = 5\cos(\alpha)$ and $T_2 = 5\sin(\alpha)$

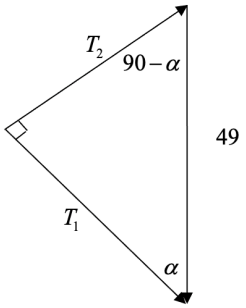
C. $T_1 = 5\tan(\alpha)$ and $T_2 = \dfrac{5}{\tan(\alpha)}$

D. $T_1 = 49\sin(\alpha)$ and $T_2 = 49\cos(\alpha)$

E. $T_1 = 49\cos(\alpha)$ and $T_2 = 49\sin(\alpha)$

ANSWER E

The forces are in newtons, the weight force is $mg = 5 \times 9.8 = 49$ newtons.



By Lami's theorem, $\dfrac{T_1}{\sin(90-\alpha)} = \dfrac{T_2}{\sin(\alpha)} = \dfrac{49}{\sin(90^0)}$

$T_1 = 49\cos(\alpha)$ and $T_2 = 49\sin(\alpha)$

