2024-Ph-H1-Q3

Section: Our Dynamic Universe
Topic: Forces

Summary:
A box is suspended from a ceiling by a rope. A horizontal force F acts on the box. The box is held stationary at an angle of 20°. The weight of the box is 4.9 N. The tension T in the rope must be found.

Solution:

1. The tension T has vertical and horizontal components:
$T\cos 20^\circ = 4.9\,\mathrm{N}.$

2. Therefore:
$$T = \frac{4.9}{\cos 20^\circ} = \frac{4.9}{0.9397} \approx 5.2\,\mathrm{N}.$$

Answer: D. 5.2 N

Guidance for Students:

- The tension must balance both vertical weight and horizontal force components.
- Use trigonometric components: $T\cos\theta = W$ for vertical balance.

Revision Tips:

- Always resolve forces into horizontal and vertical components.
- If an object is stationary, net force = 0 in both directions.
- Learn to use $T = W/\cos\theta$ for angled ropes.