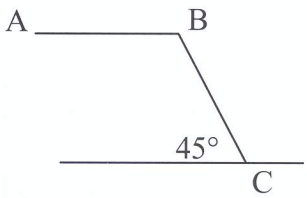
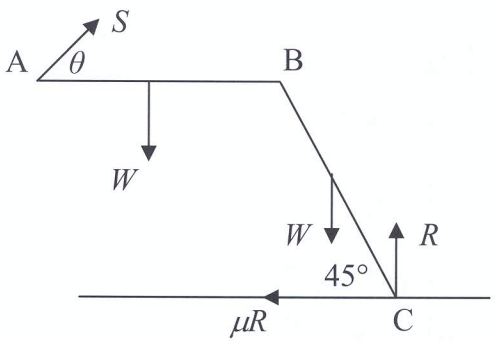
7 **(b)** Two equal uniform rods AB and BC smoothly jointed at B are in equilibrium with the end C resting on a rough horizontal surface. The end A is held above the surface.



The rod AB is horizontal and the rod BC is inclined at an angle of 45° to the horizontal.

If C is on the point of slipping find the coefficient of friction.



Moments about A for system :

$$W\ell + W\left(2\ell + \frac{\ell}{\sqrt{2}}\right) + \mu R\left(\frac{2\ell}{\sqrt{2}}\right) = R\left(2\ell + \frac{2\ell}{\sqrt{2}}\right) \quad \text{5}$$

$$3W\sqrt{2} + W + 2\mu R = 2R\sqrt{2} + 2R \quad \text{5}$$

Moments about B for BC :

$$W\left(\frac{\ell}{\sqrt{2}}\right) + \mu R\left(\frac{2\ell}{\sqrt{2}}\right) = R\left(\frac{2\ell}{\sqrt{2}}\right) \quad \text{5}$$

$$W + 2\mu R = 2R$$

$$\Rightarrow R = \frac{3W}{2} \quad \text{5}$$

$$W + 2\mu\left(\frac{3W}{2}\right) = 2\left(\frac{3W}{2}\right)$$

$$\mu = \frac{2}{3} \quad \text{5}$$

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