2000

Q4 (b)(iii)

Find acceleration of particle

$$m(f - a\cos 45) = mg\sin 45^\circ$$

$$\Rightarrow mf - \frac{mg}{5}\cdot\frac{1}{\sqrt{2}} = mg\cdot\frac{1}{\sqrt{2}}$$

$$\Rightarrow f = \frac{g}{\sqrt{2}} + \frac{g}{5\sqrt{2}}$$

$$\Rightarrow \boxed{f = \frac{6g}{5\sqrt{2}}}$$

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Initial speed of particle $u = 0$

Find time for which motion is happening

For wedge

$u = 0$
$v = ?$
$t = ?$
$a = \frac{g}{5}$

$$\Rightarrow v = u + at$$

$$1 = 0 + \frac{g}{5}t$$

$$\boxed{\frac{5}{g} = t}$$

∴ For particle:

$u = 0$
$a = \frac{6g}{5\sqrt{2}}$
$t = \frac{5}{g}$
$v = ?$

$$\Rightarrow v = u + at$$

$$v = 0 + \frac{6g}{5\sqrt{2}}\left(\frac{5}{g}\right)$$

$$\boxed{v = \frac{6}{\sqrt{2}} \text{ m/s}}$$

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