3 (b)

$r_j = 0$ on inclined plane

$$u\sin(\theta-45).t - \tfrac{1}{2}g\cos 45.t^2 = 0$$

$$\Rightarrow \quad t = \frac{2u\sin(\theta-45)}{g\cos 45}$$

$$= \frac{2u\{\sin\theta\cos 45 - \cos\theta\sin 45\}}{g\cos 45}$$

$$= \frac{2u}{g}\{\sin\theta - \cos\theta\}$$

5

$$\tan 45 = \frac{-v_j}{v_i}$$

$$\Rightarrow v_i = -v_j$$

$$u\cos(\theta-45) - g\sin 45.t = -u\sin(\theta-45) + g\cos 45.t$$

5

$$u\sin(\theta-45) + u\cos(\theta-45) = \sqrt{2}.g.t$$

$$u\{\sin\theta\cos 45 - \cos\theta\sin 45 + \cos\theta\cos 45 + \sin\theta\sin 45\} = \sqrt{2}.g.t$$

5

$$\sqrt{2}.u\sin\theta = \sqrt{2}.g.t$$

$$\sin\theta = \frac{gt}{u}$$

$$\sin\theta = \frac{g}{u}\left[\frac{2u}{g}\{\sin\theta - \cos\theta\}\right]$$

5

$$= 2\sin\theta - 2\cos\theta$$

$$2\cos\theta = \sin\theta$$

$$\Rightarrow \tan\theta = 2$$

5

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