**5.13** In Fig. 5.3, a body A of mass m slides on plane inclined at angle θ_1 to the horizontal and μ_1 is the coefficent of friction between A and the plane. A is connected by a light string passing over a frictionless pulley to another body B, also of mass m, sliding on a frictionless plane inclined at angle θ_2 to the horizontal. Which of the following statements are true?

(a) A will never move up the plane.

(b) A will just start moving up the plane when
$$\mu = \frac{\sin\theta_2 - \sin\theta_1}{\cos\theta_1}.$$

(c) For A to move up the plane, θ_2 must always be greater than θ_1.

(d) B will always slide down with constant speed.

Fig. 5.3

$\Rightarrow$
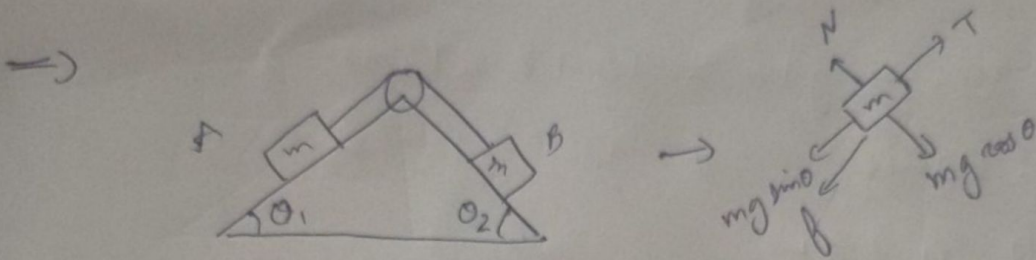
When A moves up $\Rightarrow$ (Boundary Case)

$T = mg \sin \theta_1 + f_1$

$T = mg \sin \theta_1 + \mu \, mg \cos \theta_1$ — ①

$T = mg \sin \theta_2$ — ②

① & ②, $\sin \theta_2 = \sin \theta_1 + \mu \cos \theta_1$

$$\boxed{\mu = \frac{\sin \theta_2 - \sin \theta_1}{\cos \theta_1}}$$

Ans (b), (c)