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Experiment No -2

Determination of coefficient of friction between flat Belt & Pulley

* Questions

Q.1) State the laws of friction?

Ans → The laws of friction are -

① The force of friction always acts in a direction opposite to that in which body tends to move.

② Till the limiting value is reached, the magnitude of friction is exactly equal to the force which tends to move the body.

③ The magnitude of the limiting friction bears a constant ratio to the normal reaction between the two surfaces of contact and this ratio is called coefficient of friction.

④ The force of friction depends upon the roughness /smoothness of the surfaces.

⑤ The force of friction is independent of the area of contact between the two surfaces.

⑥ After the body starts moving, the dynamic friction comes into play, the magnitude of which is less than that of limiting friction and it bears a constant ratio with normal force. This ratio is called coefficient of dynamic friction.

Q2) what is the difference between static friction and dynamic friction?

Ans→   Static friction is associated with the body at rest (no relative motion between bodies in contact) and is dependent on the magnitude of force being applied for sliding to let in. It linearly increases to maximum value right before sliding occurs and thus is a self-adjusting opposing force that restricts the movement of an object.

Dynamic friction is the friction which acts between the bodies that are in relative motion with respect to each other. It is independent of the magnitude of force on velocities of the sliding object and remains constant over the course of motion.

Q3) Define the coefficient of the friction, and angle of friction.

Ans→ Coefficient of friction -
coefficient of friction is defined as the ratio of the force required to move tow sliding surfaces over each other, and the force holding them together.

Angle of friction -
Angle made by the resultant of normal reaction and limiting friction with the normal reaction is called angle of friction.

Q4) what do you mean by the angle of lap?

Ans→ The angle of lap is defined as the angle subtended by the portion of the belt which is in contact at the pulley surface of the pulley. It is denoted by 'β'.

Q5) what is the relationship between tight tension and slack tension for a flat belt passing over a stationary pulley?

Ans→ Mathematical expression for the relationship between tight and slack side is given by: -

$$\frac{\text{tight side}}{\text{slack side}} = e^{\mu\beta}$$

where angle β is is known as 'Angle of lap' and μ is termed as coefficient of friction and e is constant.