Course Code: ESC106A
Course Title: Construction Materials and Engineering Mechanics

Lecture No. 51:
Wedge and Problems on Wedge Friction

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Lecture Intended Learning Outcomes

At the end of this lecture, students will be able to:

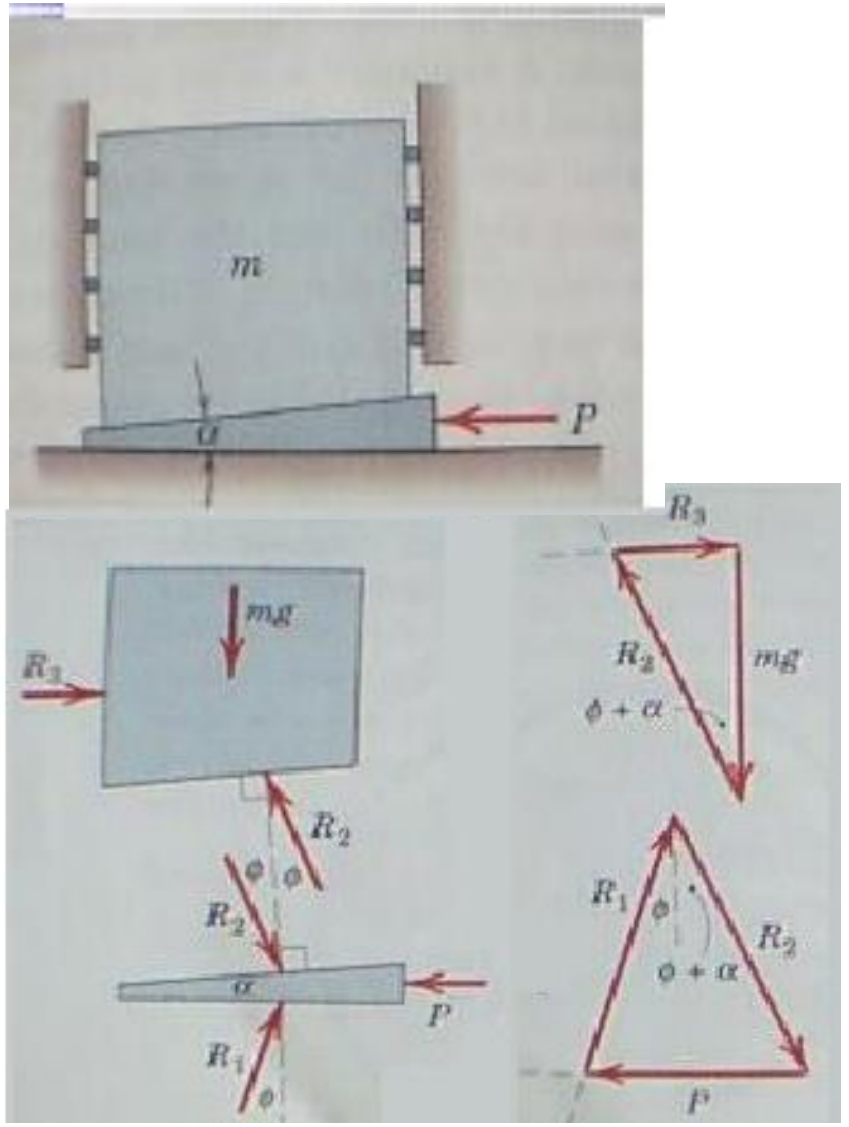
- Define wedge and wedge friction
- Draw Free Body diagrams of wedge in the given problems
- Evaluate frictional forces or find the force needed to lift the wedge

Contents

- Mechanism of Wedges
- Generating FBD for wedges
- Numerical problems on wedges

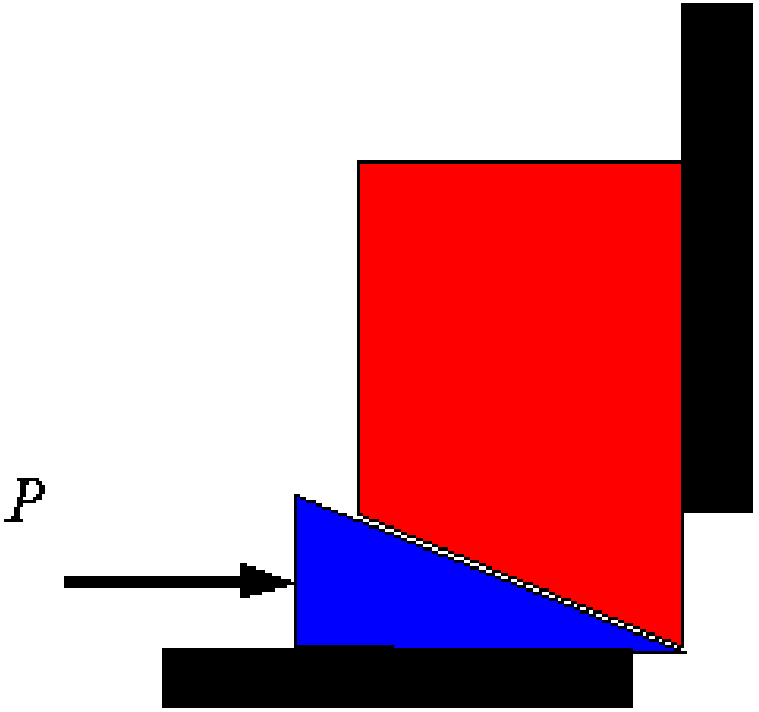
WEDGE

- A wedge is one of the simplest and most useful machine
- A wedge is used to produce small adjustments in the position of the body or to apply large forces
- Wedges largely depend on friction or function



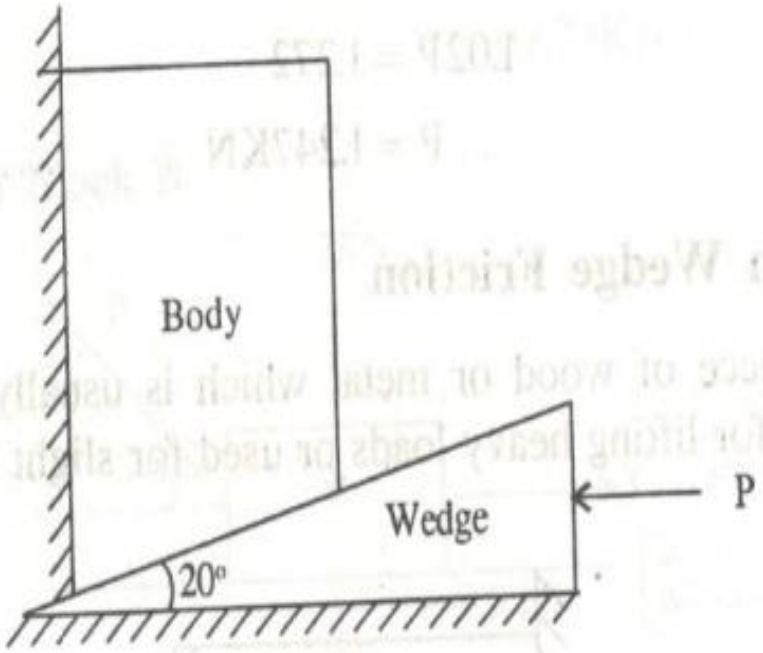
WEDGE

- A wedge is piece of wood or metal and is usually of a triangular or trapezoidal in cross-section
- Can be used for lifting loads or for slight adjustments in the position of a body
- Problems on wedges are generally the problems of equilibrium on inclined planes
- Equilibrium method or Lami's theorem are applied to solve these problems



Wedge Friction: Problem 1

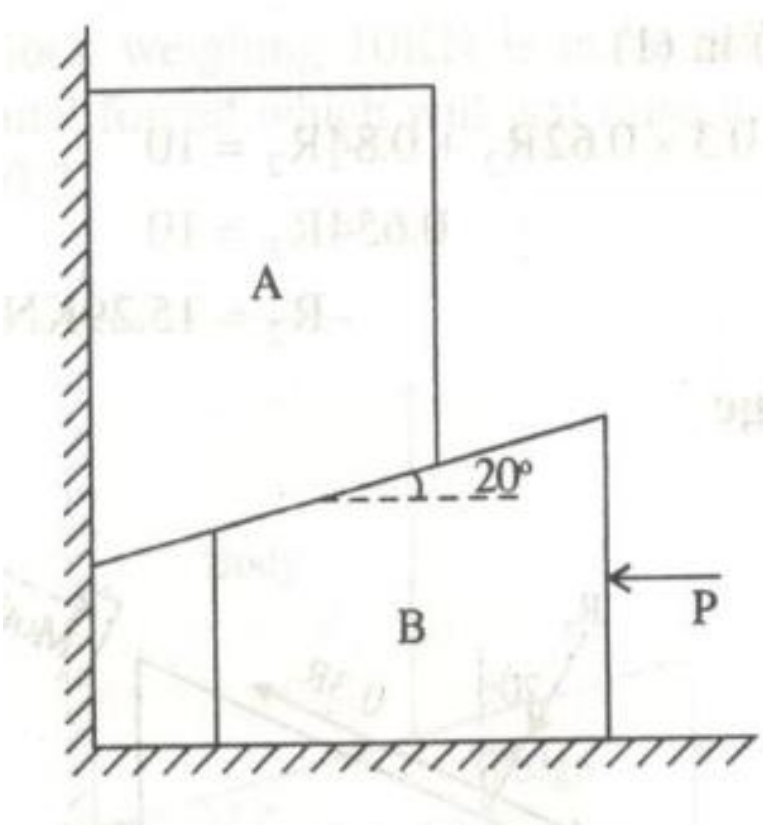
Example: A block weighing 10kN is to be raised by means of 20^{o} wedge as shown in figure. Find the horizontal force which will just raise the block if coefficient of friction for all surfaces of contact is 0.3



P=13.6kN

Wedge Friction: Problem 2

Example: Determine the force P that must be applied to the 20kN block B to lift the 100kN block A shown in figure. The coefficient of friction for all contact surface is $\mu = 0.3$



P=142.2kN

Summary

- A wedge is used to produce small adjustments in the position of the body or to apply large forces
- Based on the concept of wedge friction, problems are solved