ME 245 : Engineering Mechanics and Theory of Machines

Lecture-1: Introduction

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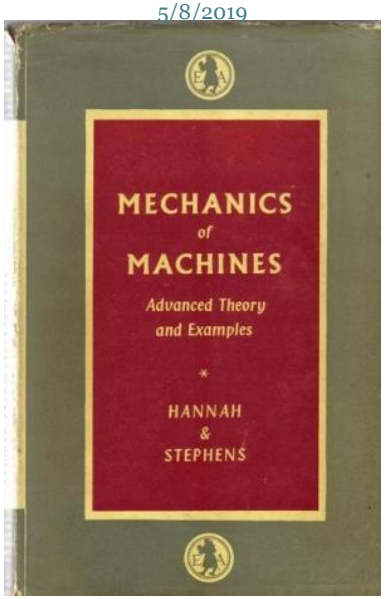
Course Content

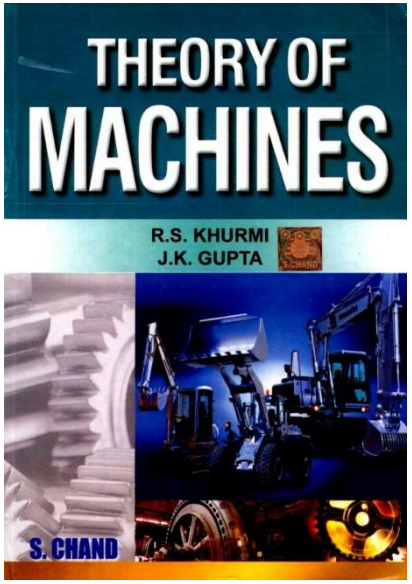
1. Study of cams
2. Gears and gear trains
3. Static and dynamic balancing of rotating components
4. Power transmition by ropes, belts and chains
5. Undamped and damped free vibration of one and two degrees of freedom
6. Forced vibrations
7. Whirling of shafts and rotors
8. And so on.

Reference books

- Mechanics of Machines
  - Hannah & Stephens

- Theory of Machines
  - R.S. Khurmi & J.K. Gupta

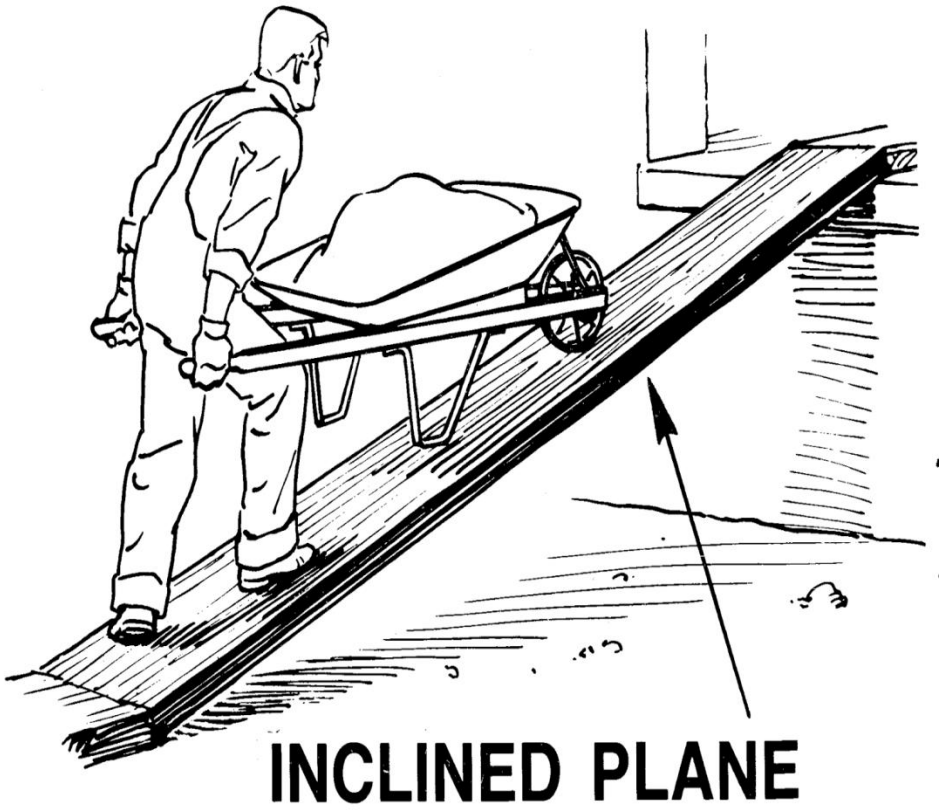




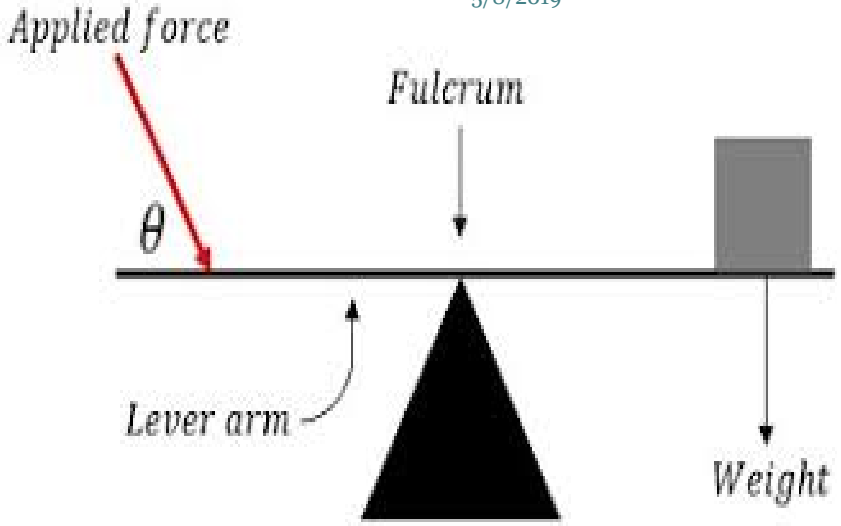
What is a Machine?

A **machine** is a contrivance or mechanism by means of which a **force**, applied at one part of the machine, is transmitted to another part, in order to secure **mechanical advantage** for some particular purpose. There are basically six types of machine:

- **The inclined plane** - used for raising a load by means of a smaller applied force. Mechanical advantage is resisted by some friction.

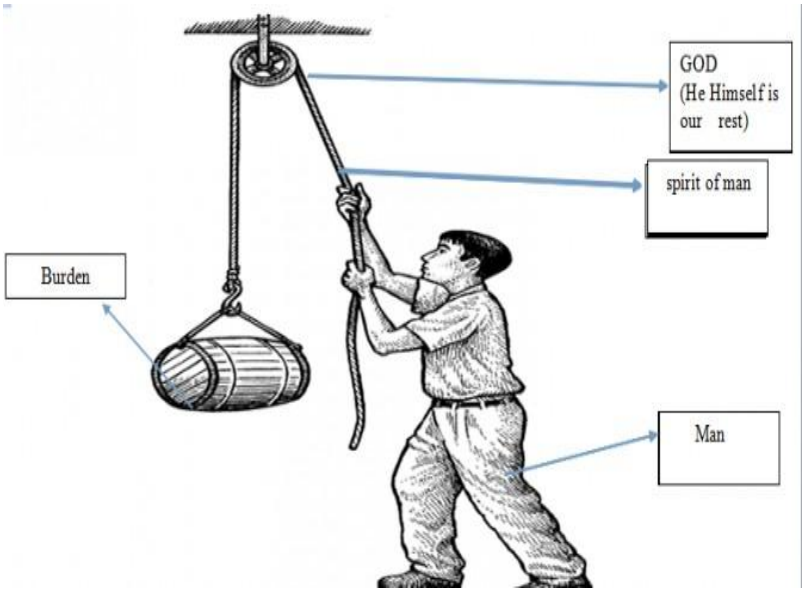


- **The lever**
  - involves a load, a fulcrum and an applied force. Often just a uniform bar.



The pulley

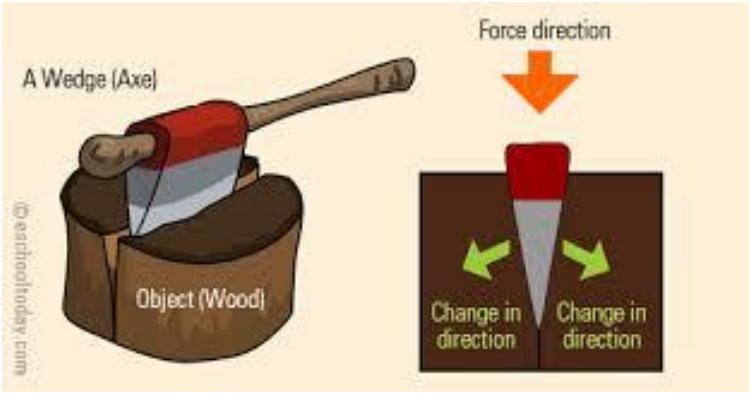
- In simplest form it changes the direction of a force acting along a cord or rope.



George Herbert's "The Pulley":

- **The screw**
  - constructed using the principle of the inclined plane set on a cylindrical or conical surface. A screw-jack lifts heavy weights. Many screw-threads are in everyday use.

- **The wedge**
  - a double inclined plane. Mechanical advantage is considerably resisted by friction.



The wheel and axle

- Used to draw water from a well etc. by ropes attached to a large wheel and to a smaller axle. A differential wheel and axle has two-part axle sizes and gains considerable mechanical advantage.