

MECHANICS OF MACHINERY



Kinematic Synthesis

- *Design or creation of a mechanism to yield a desired set of motion characteristics*
- Carried out
 - Graphical methods
 - Analytical methods
- Parts of synthesis
 - Type synthesis
 - Number synthesis
 - Dimensional synthesis

Type synthesis

- Beginning phase
- Refers to kind of mechanism selected
- Eg- a geared system,
belt and pulley,
a cam system or
even a linkage

Number synthesis

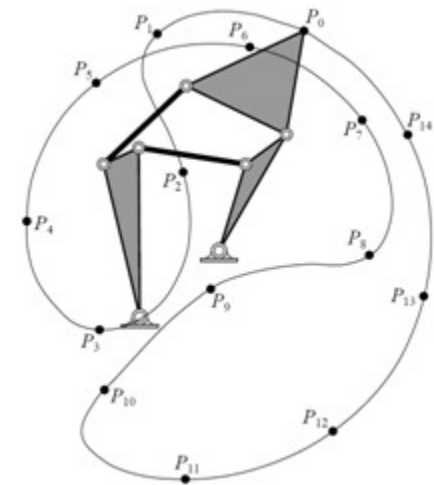
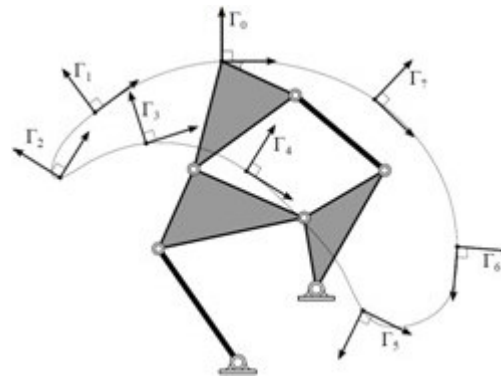
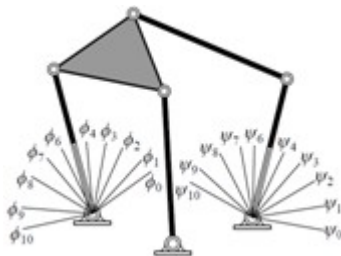
- Deals with the number of joints or pairs that are required to obtain desired mobility
- *Gruebler's criterion for dof of planar mechanism*

Dimensional synthesis

- Deals with determination of kinematic dimensions of the mechanism to satisfy the required motion characteristics
- Determining dimensions of individual links
- Graphical as well as analytical methods are available.
- Choice of the method depends on type of problem

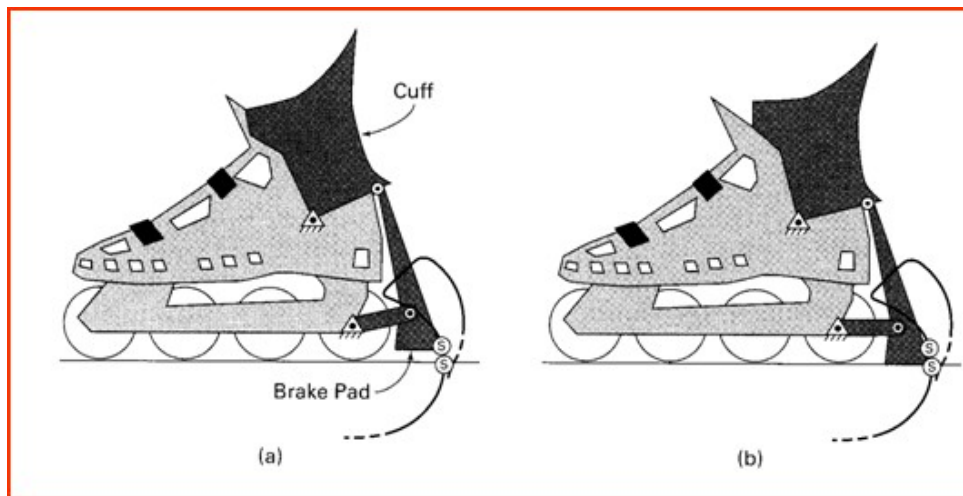
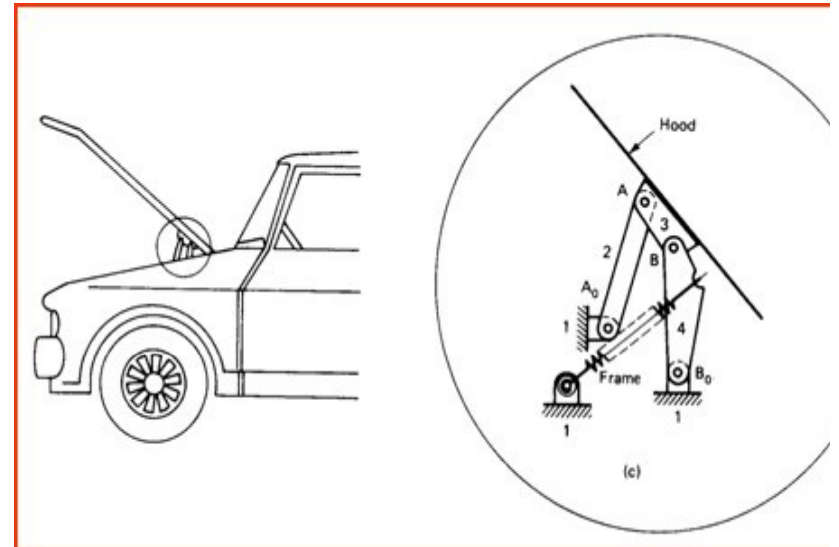
Type of problem

- Motion generation problem
- Path generation problem
- Function generation problem



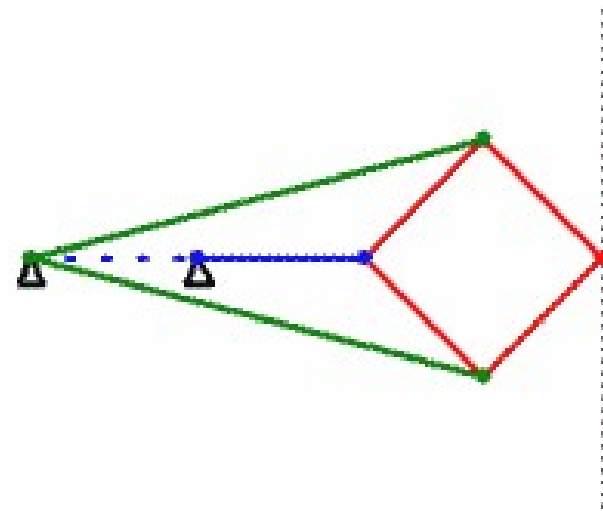
Motion generation problem

- The required positions of the coupler are given
- *Design a linkage, so that a rigid body can be guided in a prescribed manner*
- Guidance may or may not be coordinated with input parameter



Path generation

- A point on the floating link(eg. Coupler) is to guided along a prescribed path
- Path may or may not be coordinated with input movement



Function generation problem

- Maintain a prescribed relationship between the output and input motion
- Rotary motion of input and output link be rotating θ and ϕ angle.
- $\Phi = f(\theta)$

