

ME5243: Advanced Mechanism Design
Mechanism Classification

1. Below are link lengths for a 4-bar. In a group of 2 or 3, discuss and answer the following for one of the linkages:

Linkage 1

Ground Link: 2 cm

Input Link: 3.5 cm

Coupler Link: 4 cm

Output Link: 5 cm

Linkage 2

Ground Link: 3.5 cm

Input Link: 4 cm

Coupler Link: 2 cm

Output Link: 5 cm

Linkage 3

Ground Link: 3.5 cm

Input Link: 4 cm

Coupler Link: 5 cm

Output Link: 2 cm

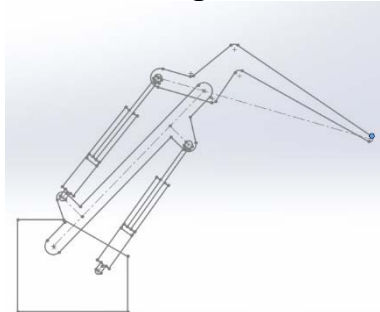
- a) What is the range-of-motion classification of this linkage? How do you know?
- b) Sketch the mechanism at multiple positions (at least 6) through the range of motion. Consider drawing the ground link horizontally for simplicity. Does the motion agree with your classification?

2. Identify the task classification and discuss your reasoning

a) Locking pliar



d) Crane Linkage



g) Window Opening Mechanism



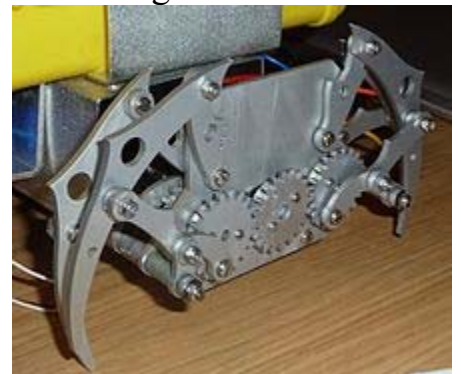
b) Robot arm & manipulator



e) Rooftop Kayak Loader



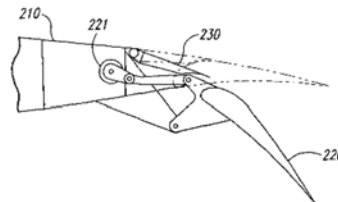
h) Robot Leg Mechanism



c) Oar linkage



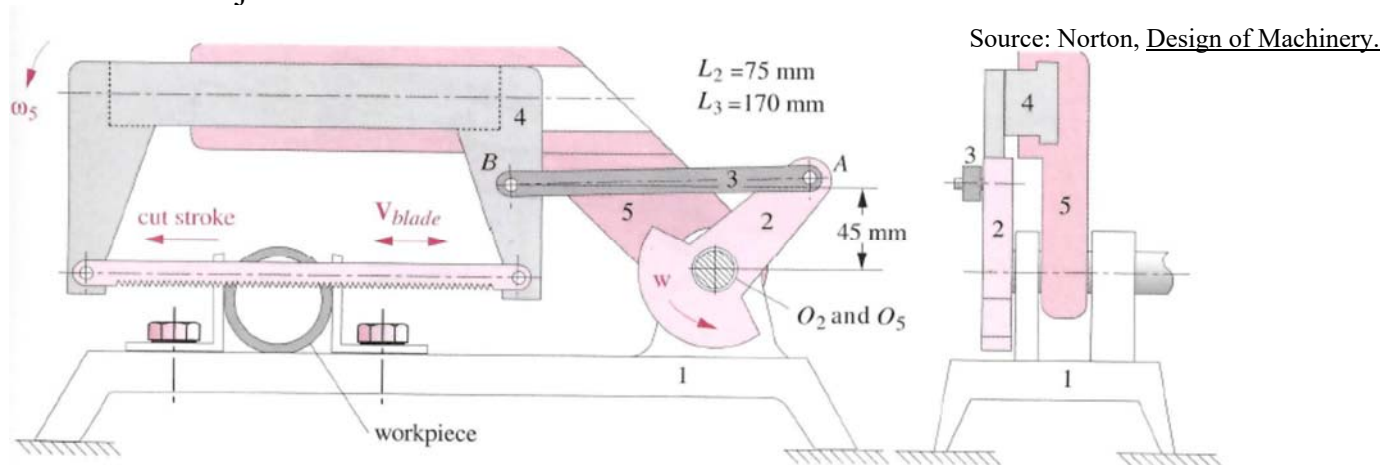
f) Aircraft Wing Mechanism



3. Draw all of the inversions of the Stephenson and Watt six bar chains. Identify what tasks each inversion is best suited.

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Mechanism Classification – Part 2

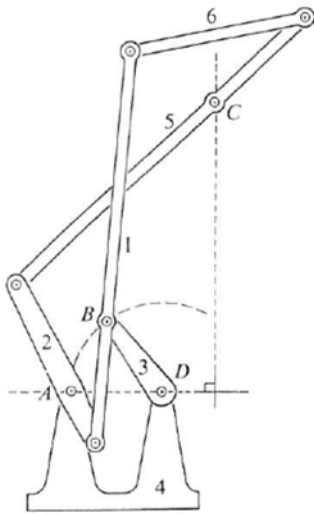
4. Shown below is a power hacksaw. Link 5 pivots at O_5 and its weight forces the sawblade against the workpiece while the linkage moves the blade (link 4) back and forth within link 5 to cut the part.
- Sketch the kinematic diagram.
 - What **type** of mechanism is it?
 - Draw a second diagram of the kinematic equivalent mechanism containing only revolute joints.



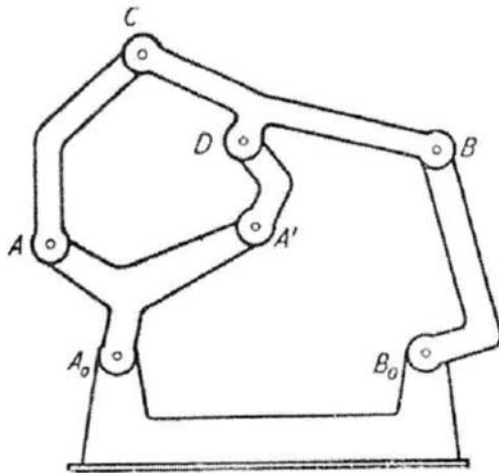
5. Determine what type of sixbar linkage is shown in each figure below

Figure source: Norton, Design of Machinery.

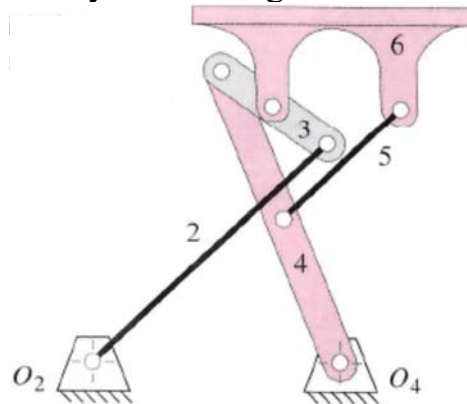
a) Hart inversor linkage



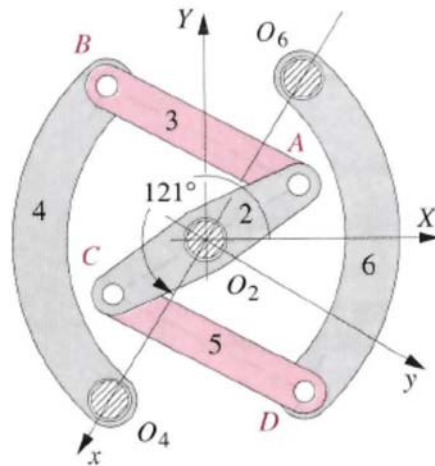
b) Mechanism



c) Chebyshev straight-line mechanism



d) Drum brake mechanism



e) Entertainment cabinet

