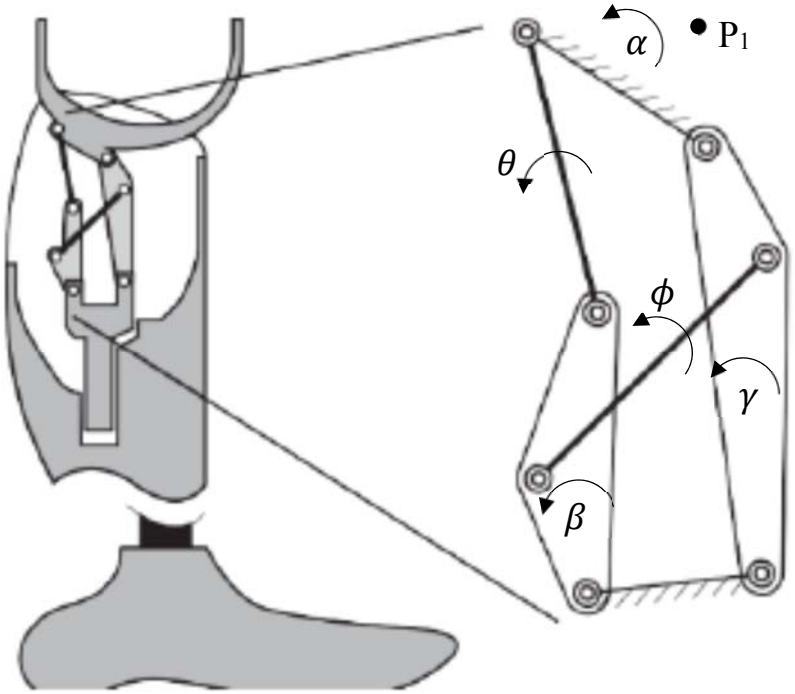
ME5243: Advanced Mechanism Design

Six-Bar Synthesis

For all six-bars below:

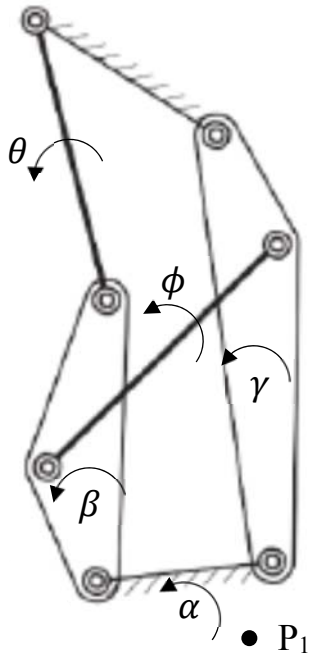
1. Determine what type of six-bar it is?
2. Write a series of vector loop equations in standard form. State the order they are solved and what free choices are made.

I. Prosthetic Knee: Consider the movement of the thigh with respect to the calf through 4PPs.



Prescribed:
$\overrightarrow{\delta_j}$'s, α's, and β's (friction)

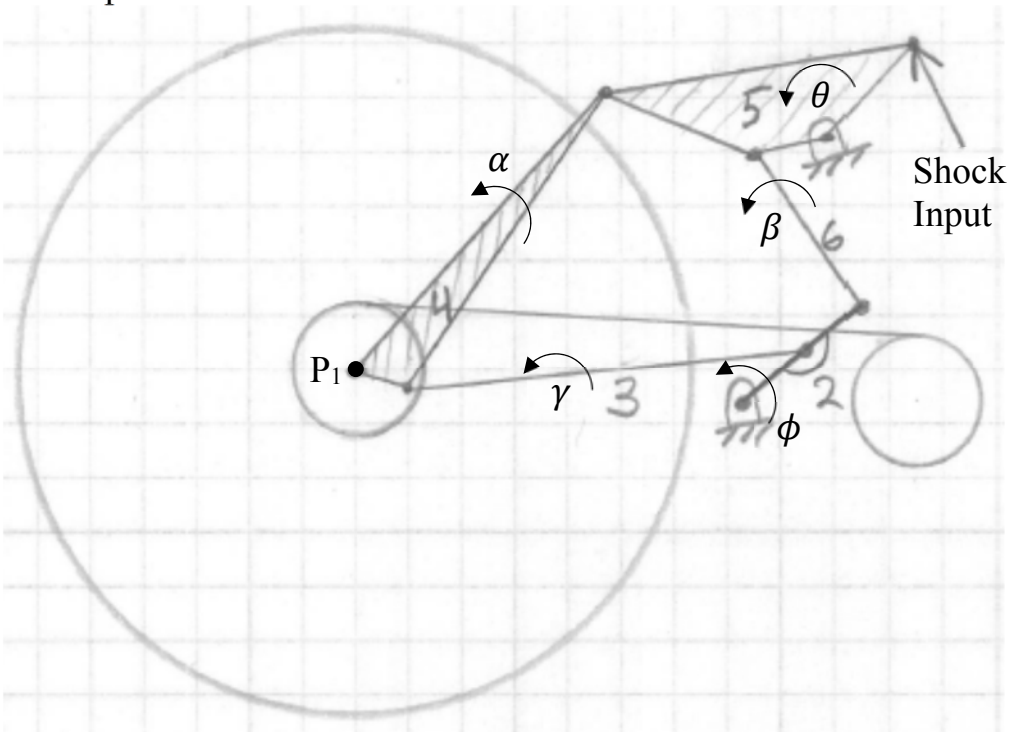
II. Prosthetic Knee: Consider the movement of the calf with respect to the thigh through 4PPs.



Prescribed:
$\overrightarrow{\delta_j}$'s, α's, and $(\beta - \alpha)$'s (friction)

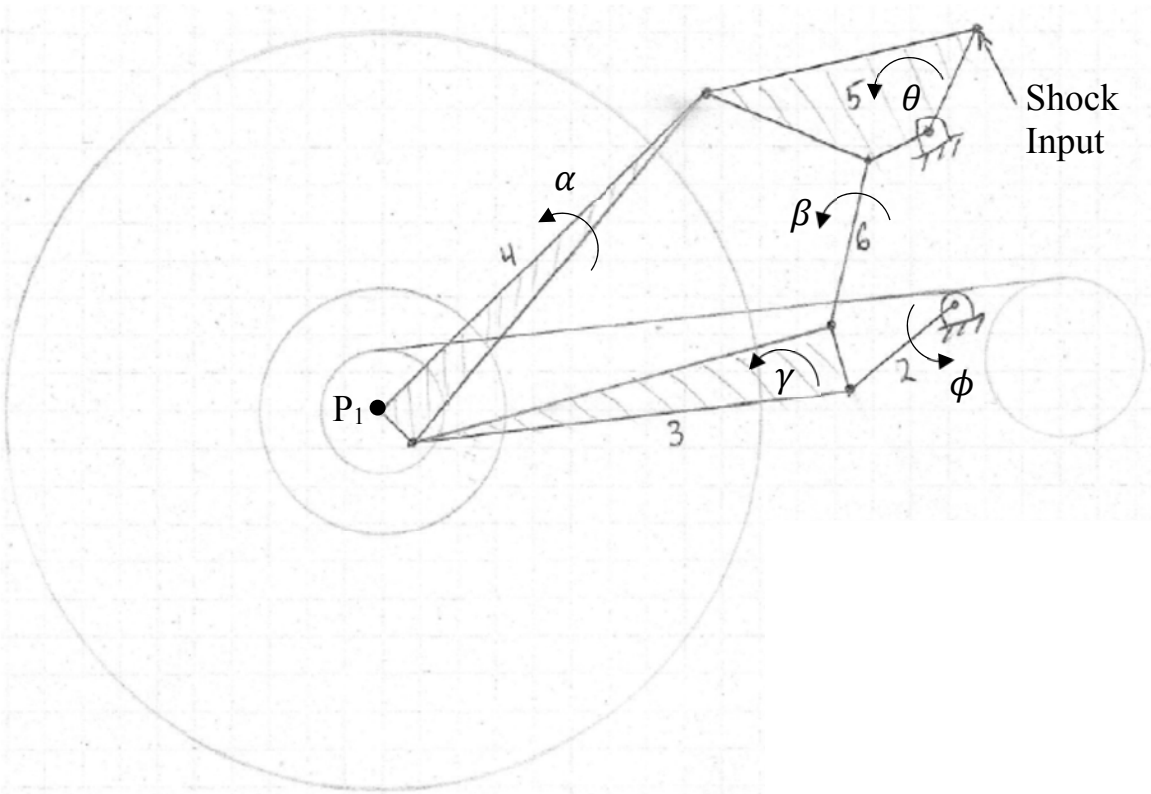
III. Rear Bicycle Suspension 1 – Stephenson I

Prescribed:
$\overrightarrow{\delta_J}$'s and θ's



IV. Rear Bicycle Suspension 2

Prescribed:
$\overrightarrow{\delta_J}$'s and θ's

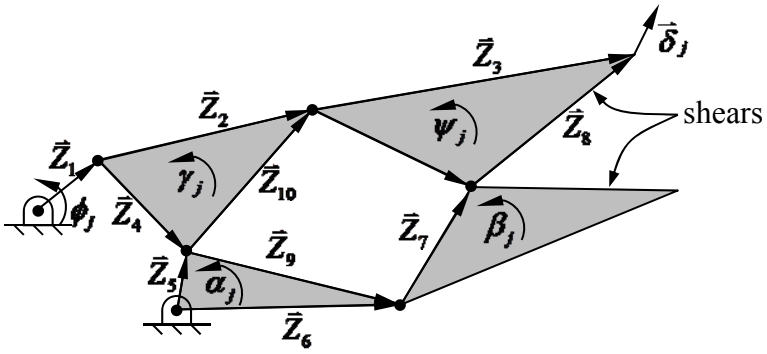


V. “Flying Shear”: mechanism used to cut strapping on a box moving on a conveyor belt.

ψ_j, β_j, and $\overrightarrow{\delta_j}$ are prescribed.

1) What type of six-bar mechanism is this?

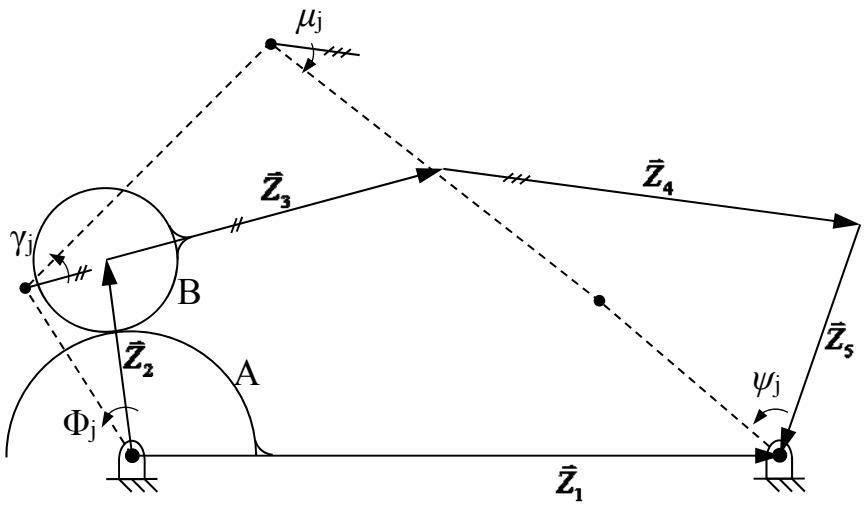
2) Write a series of vector loop equations in standard form. State the order they are solved and what free choices are made. What different options exist if there are 3PP vs. 4PP?



ME5243: Advanced Mechanism Design

Geared 5-bar Function Generation Synthesis

1. Write an equation for the rotation of link 3 (γ_j) in terms of the rotation of link 2 (ϕ_j) and the number of teeth on gears A and B.
2. Write a vector loop equation for the linkage in the jth position that includes all of the links.
3. Complete the table below of the number of PPs vs. free choices



#PP	# Vector Loop Eqns	# Scalar Eqns	Unknowns	#Unknowns	# Free Choices
2					
3					