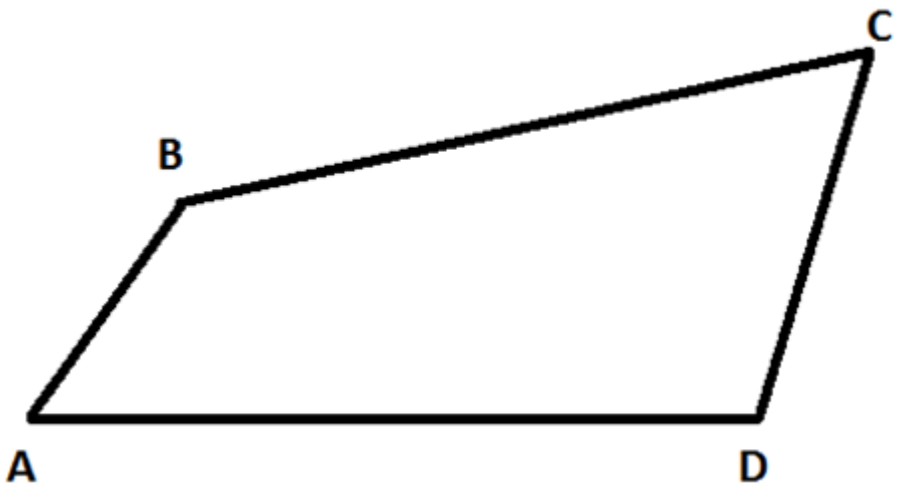
Ex. No. 1.-SIMULATION ANALYSIS ON FOUR BAR CHAIN MECHANISM

DATE:

AIM:

To determine & simulate the displacement & velocity analysis for the given four bar chain mechanism.

In a four bar chain ABCD, AD is fixed and is 120 mm long. The crank AB is 30 mm long and rotates at 100 rpm clockwise, while the link CD = 60mm oscillates about D. BC and AD are of equal lengths. ∟BAD = 600.



REQUIREMENTS:

● Mech Analyzer software.

● Processor: Minimum 1.5 GHz

● RAM: Minimum 512 MB

● Operating System: Windows XP, Windows Vista, Windows 7, Windows 8 or higher.

● Dependencies: Microsoft .Net 2.0 framework

- Mini Drafter.
- Geometry instruments.

PROCEDURE:

1. Draw a horizontal line AD of length 120 mm.
2. At A, Draw a line AB of length 30 mm at an angle of 600
3. With B as centre, BC = AD = 120mm draw an arc
4. With D as centre, CD = 60 mm draw another arc
5. Join BC and DC

Velocity of the input link:

Speed of the crank, $N_{BA} = 100$ rpm (given)

$$\omega_{BA} = \frac{2\pi N_{BA}}{60} = \frac{2\pi \times 100}{60}$$

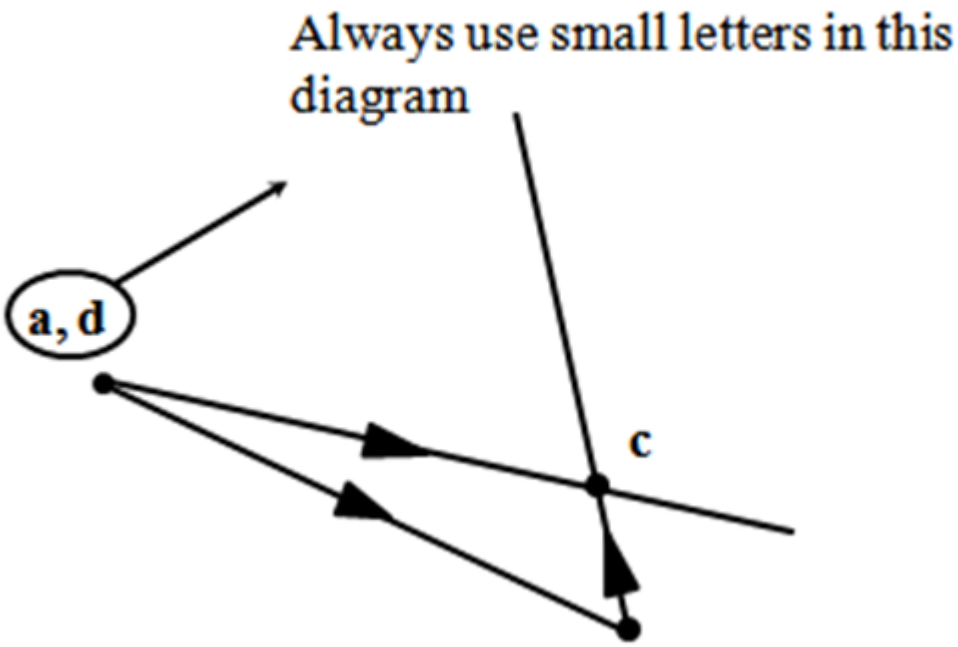
$$\omega_{BA} = 10.47 \text{ rad/s}$$

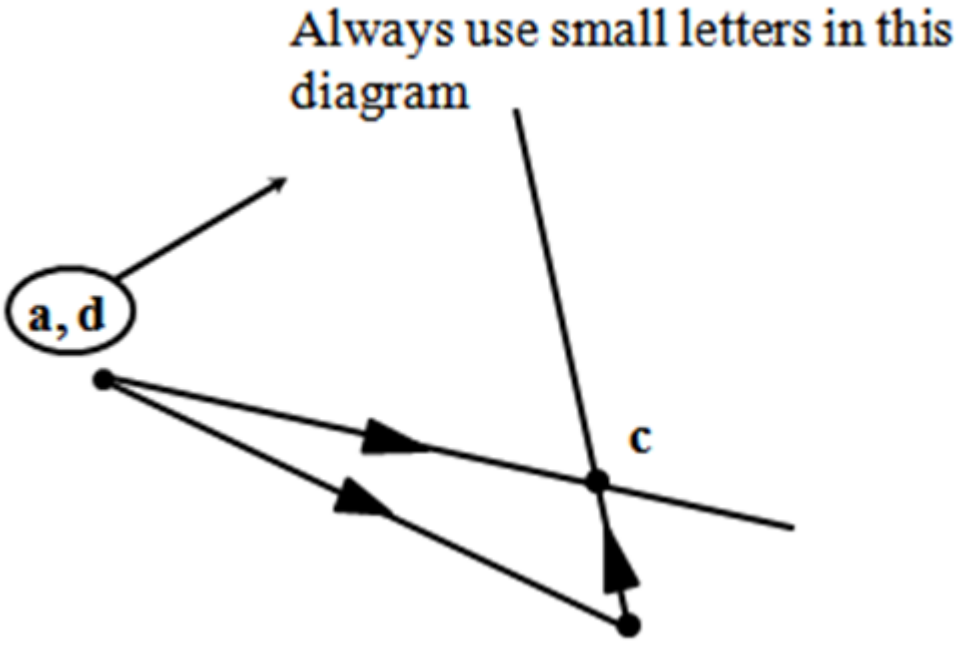
We know that, $V_{BA} = \omega_{BA} \times AB = 10.47 \times \frac{30}{1000}$

$$\boxed{V_{BA} = 0.3141 \text{ m/s}}$$

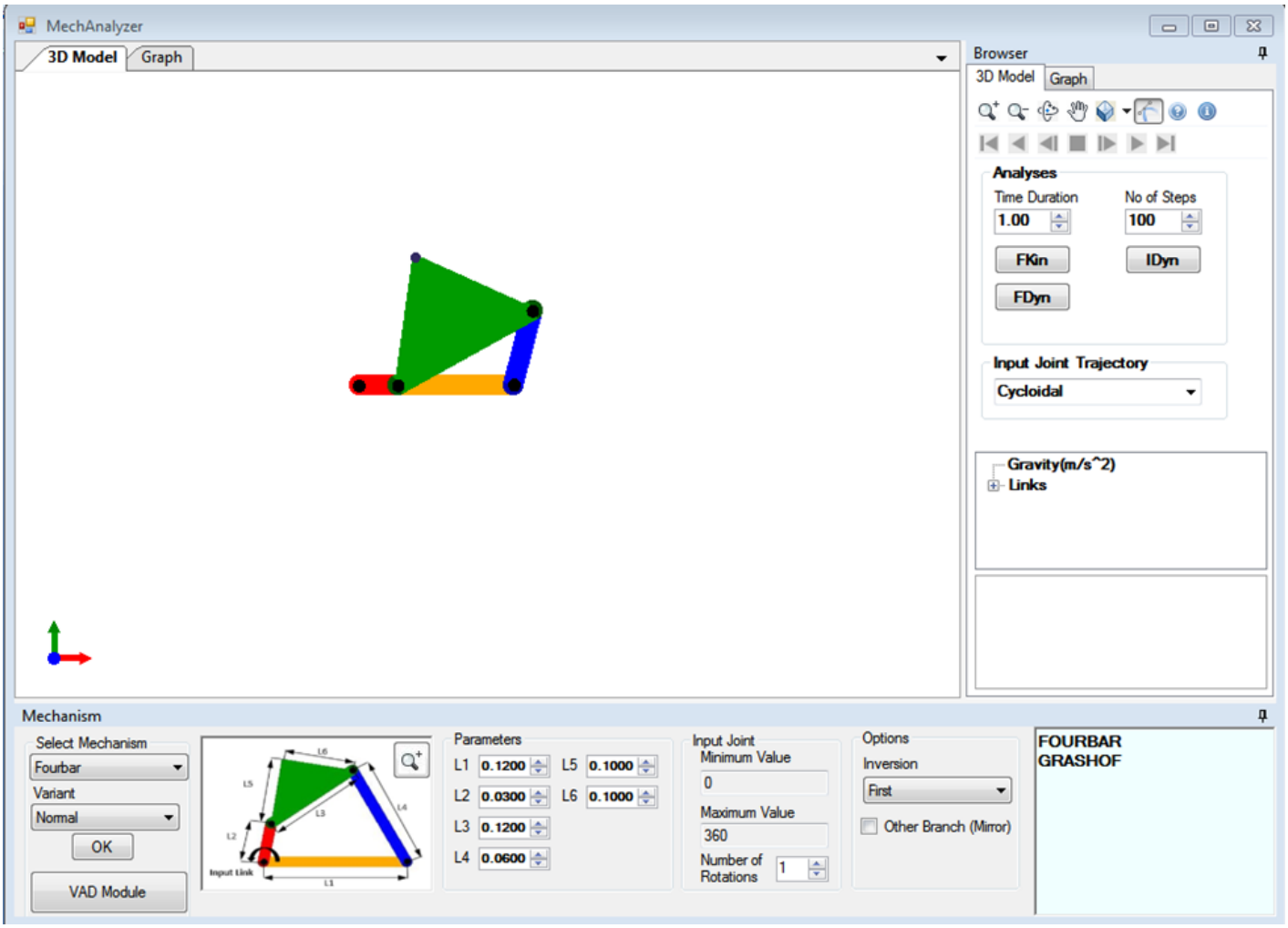
- This value of VBA is used to decide the scale for the velocity diagram
- Let us construct the velocity diagram taking a scale:
- 0.3141 m/s = 60 mm (say)
- 1. The fixed link AD, appears as a point in the velocity diagram
- 2. From a, draw ab = 60mm, perpendicular to AB in configuration diagram and in the direction of velocity (downward direction)
- 3. From b, draw vector bc perpendicular to BC

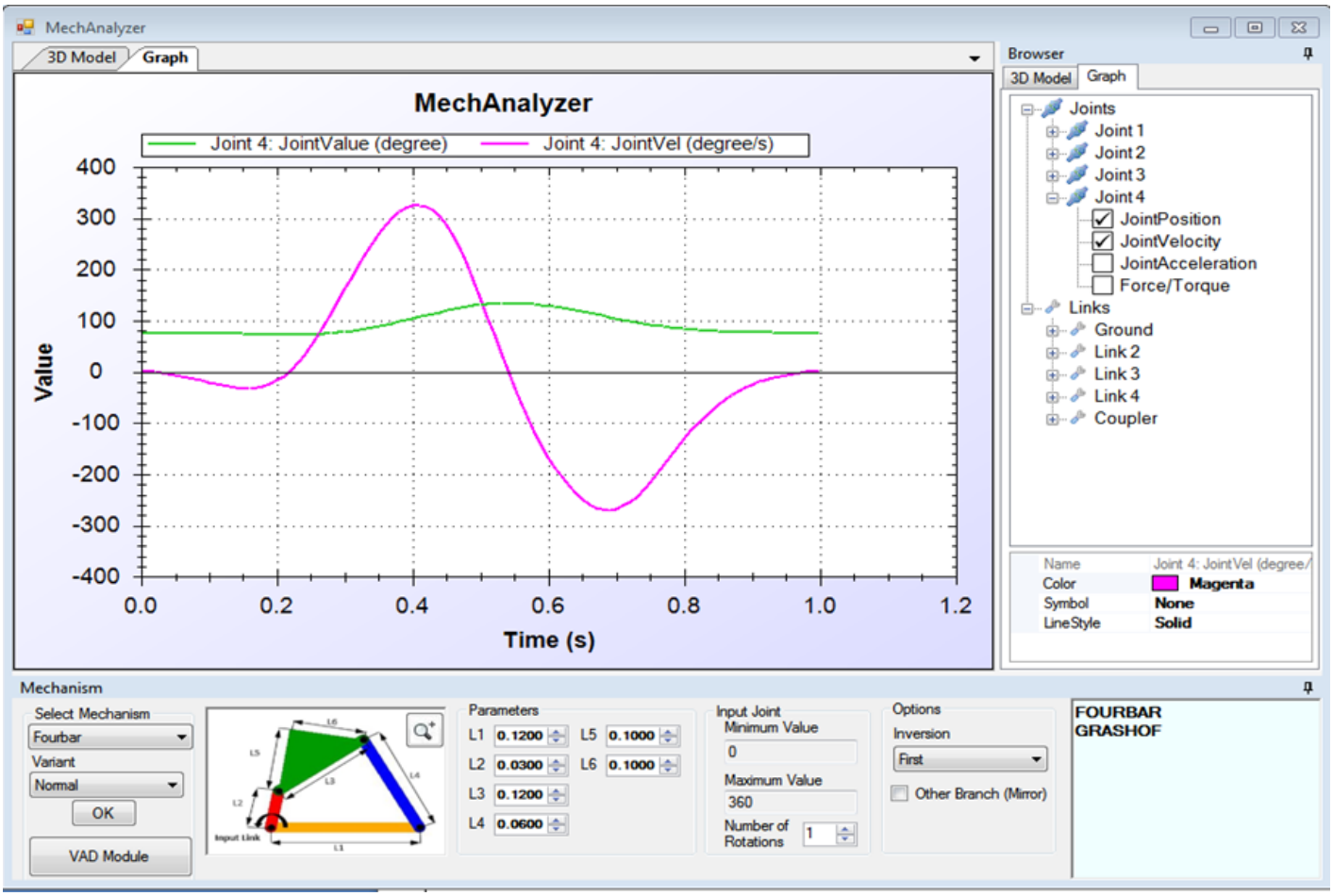
- 4. From (a,d), draw vector cd perpendicular to CD. This will intersect the previous vector at c.

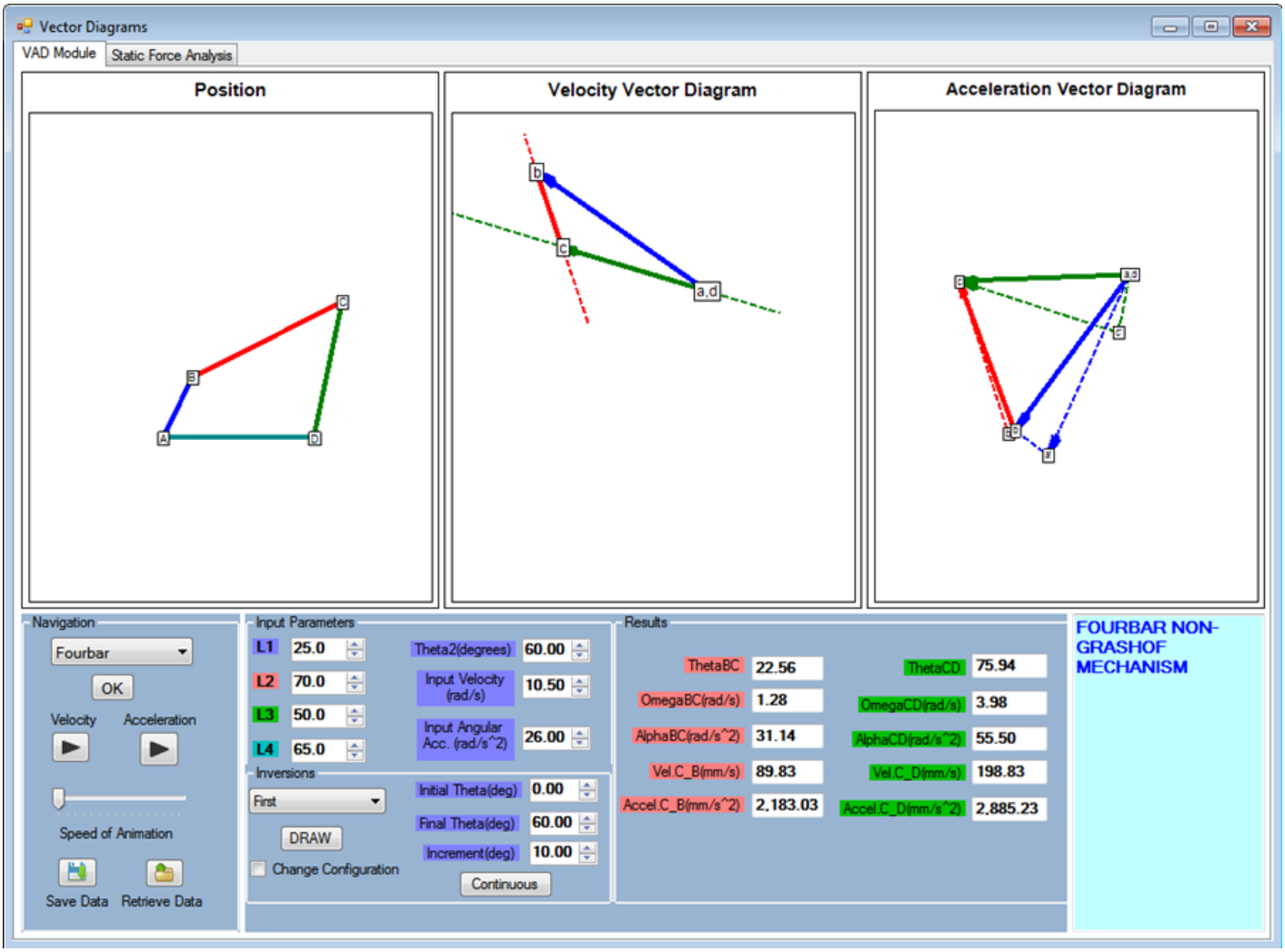




- 1. First measure cd from velocity diagram
- 2. Now, Calculate VCd using the scale of the diagram
- 3. Finally, calculate ωcd from the relation v = rω
- Thus, link CD revolves with ωcd = 4 rad/s (clockwise about D)


MechAnalyzer
3D Model
Graph
Browser
3D Model
Graph
Analyses
Time Duration
1.00
No of Steps
100
FKin
IDyn
FDyn
Input Joint Trajectory
Cycloidal
Gravity(m/s^2)
Links
Mechanism
Select Mechanism
Fourbar
Variant
Normal
OK
VAD Module
Parameters
L1 0.1200
L2 0.0300
L3 0.1200
L4 0.0600
L5 0.1000
L6 0.1000
Input Joint
Minimum Value
0
Maximum Value
360
Number of Rotations
1
Options
Inversion
First
Other Branch (Mirror)
FOURBAR
GRASHOF


MechAnalyzer
3D Model
Graph
MechAnalyzer
Joint 4: JointValue (degree)
Joint 4: JointVel (degree/s)
Value
Time (s)
Browser
3D Model
Graph
Joints
Joint 1
Joint 2
Joint 3
Joint 4
JointPosition
JointVelocity
JointAcceleration
Force/Torque
Links
Ground
Link 2
Link 3
Link 4
Coupler
Name
Joint 4: JointVel (degree/
Color
Magenta
Symbol
None
LineStyle
Solid
Mechanism
Select Mechanism
Fourbar
Variant
Normal
OK
VAD Module
Parameters
L1 0.1200
L2 0.0300
L3 0.1200
L4 0.0600
L5 0.1000
L6 0.1000
Input Joint
Minimum Value
0
Maximum Value
360
Number of Rotations
1
Options
Inversion
First
Other Branch (Mirror)
FOURBAR
GRASHOF



Output:

Name:

Register Number:

RESULT:

Thus the displacement & velocity analysis for the given four bar chain mechanism is simulated.