3-2 Consider the three-link planar manipulator shown in Figure 3.23. Derive the forward kinematic equations using the DH convention.

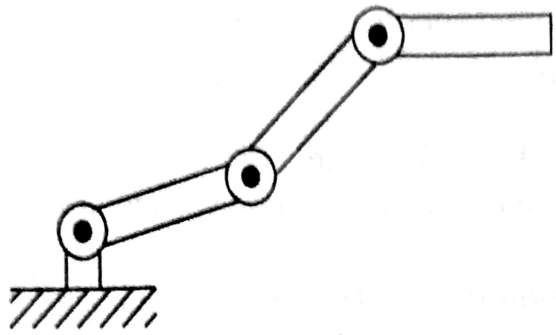

Figure 3.23: Three-link planar arm of Problem 3-2.

3-3 Consider the two-link Cartesian manipulator of Figure 3.24. Derive the forward kinematic equations using the DH convention.

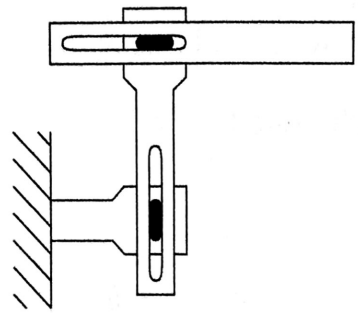

Figure 3.24: Two-link Cartesian robot of Problem 3-3.

3-4 Consider the two-link manipulator of Figure 3.25, which has joint 1 revolute and joint 2 prismatic. Derive the forward kinematic equations using the DH convention.

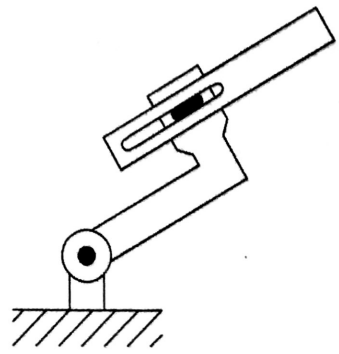

Figure 3.25: Two-link planar arm of Problem 3-4.

3-5 Consider the three-link planar manipulator of Figure 3.26. Derive the forward kinematic equations using the DH convention.

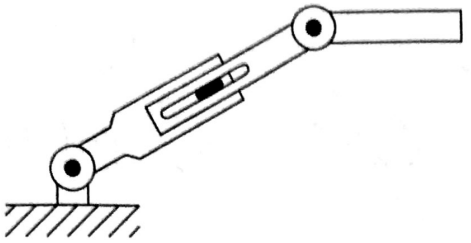

Figure 3.26: Three-link planar arm with prismatic joint of Problem 3-5.

3-6 Consider the three-link articulated robot of Figure 3.27. Derive the forward kinematic equations using the DH convention.

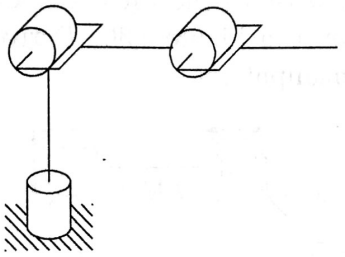

Figure 3.27: Three-link articulated robot.

3-7 Consider the three-link Cartesian manipulator of Figure 3.28. Derive the forward kinematic equations using the DH convention.

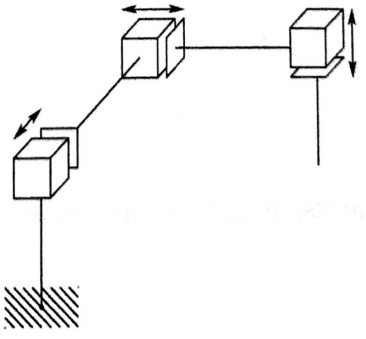

Figure 3.28: Three-link Cartesian robot.

3-12 Repeat Problem 3-11 for the three-link planar arm with prismatic joint of Figure 3.33.

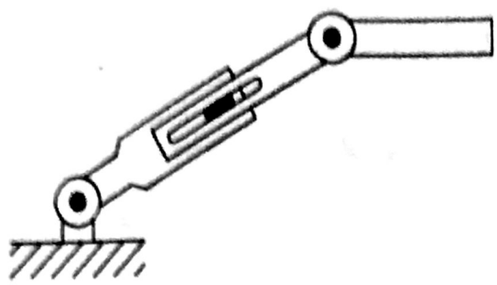

Figure 3.33: Three-link planar robot with prismatic joint.

3-13 Solve the inverse position kinematics for the cylindrical manipulator of Figure 3.34.

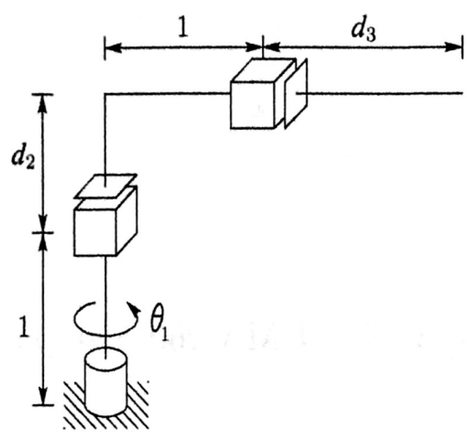

Figure 3.34: Cylindrical configuration.

3-14 Solve the inverse position kinematics for the Cartesian manipulator of Figure 3.35.

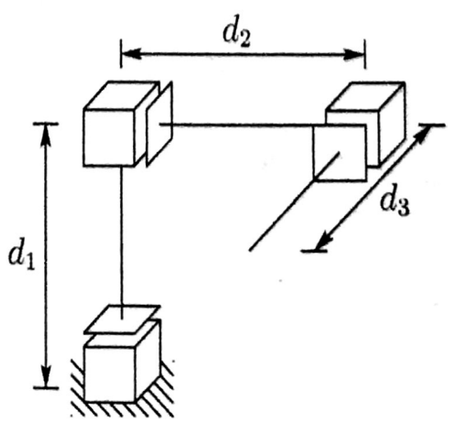

Figure 3.35: Cartesian configuration.