

## Unit 4 - Week 2

Course outline
How does an NPTEL online course work?
Pre Requisite
Week 1
Week 2
<input type="radio"/> Industrial Robot- Kinematic Structures <input type="radio"/> Robot Architectures <input type="radio"/> Kinematic Parameters <input type="radio"/> DH Algorithm <input checked="" type="radio"/> Quiz : Assignment 2
<input type="radio"/> Introduction to robotics :Week 2 Feedback Form <input type="radio"/> Lecture Materials <input type="radio"/> Assignment 2 solutions
Week 3
Week 4
Week 5
Week 6
Week 7
Week 8
Week 9
Week 10
Week 11
Week 12
Download Videos
Text Transcripts

## Assignment 2

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

Due on 2020-09-30, 23:59 IST.

1) Which section of the robotic manipulator is used for positioning of the objects in the robot work volume? 1 point

- End-effector  
 Body and arm assembly  
 base of the robot  
 Wrist assembly

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Body and arm assembly

2) The major type of manipulator joints that can be seen in industrial robots are: 1 point

- Cylindrical joints  
 Planar joints  
 Rotational joints  
 Screw joints  
 Spherical joints  
 Linear joints

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Rotational joints  
Linear joints

3) Which body-arm configurations of a robot have a disadvantage of complex kinematic modelling? 1 point

- Polar coordinate body-arm assembly  
 Cartesian coordinate body-arm assembly  
 Selective Compliance Assembly Robot Arm  
 Jointed-arm body-arm assembly  
 Cylindrical body-arm assembly

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Polar coordinate body-arm assembly  
Jointed-arm body-arm assembly

4) The total number of kinematic parameters needed to specify the kinematic configuration of a 5 axis robot is \_\_\_\_\_

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 20

1 point

5) Select the kinematic parameters which are fixed for a revolute joint of a robotic arm 1 point

- Link twist angle  
 Joint angle  
 Joint distance  
 Link length

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
Link twist angle  
Joint distance  
Link length

6) The forward kinematics of a Polar architecture robot without considering the wrist assembly will have: 1 point

- 3 joint variables which are angles.  
 2 joint variables that are angles and a joint variable which is a distance  
 1 joint variable which is an angle and 2 joint variables which are distances.  
 4 joint variables that are distances  
 All joint variables that are distances.

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
2 joint variables that are angles and a joint variable which is a distance

7) The SCARA robot which has a wrist with rolling capability will have: 1 point

- 4 degrees of freedom and 20 DH parameters, out of which 3 variables are joint angles and one is the joint distance.  
 3 degrees of freedom and 12 DH parameters, out of which 4 variables are joint angles  
 4 degrees of freedom and 16 DH parameters, out of which 3 variables are joint angles and one variable is joint distance  
 3 degrees of freedom and 15 DH parameters, out of which 4 are variables and 11 are constants

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
4 degrees of freedom and 16 DH parameters, out of which 3 variables are joint angles and one variable is joint distance

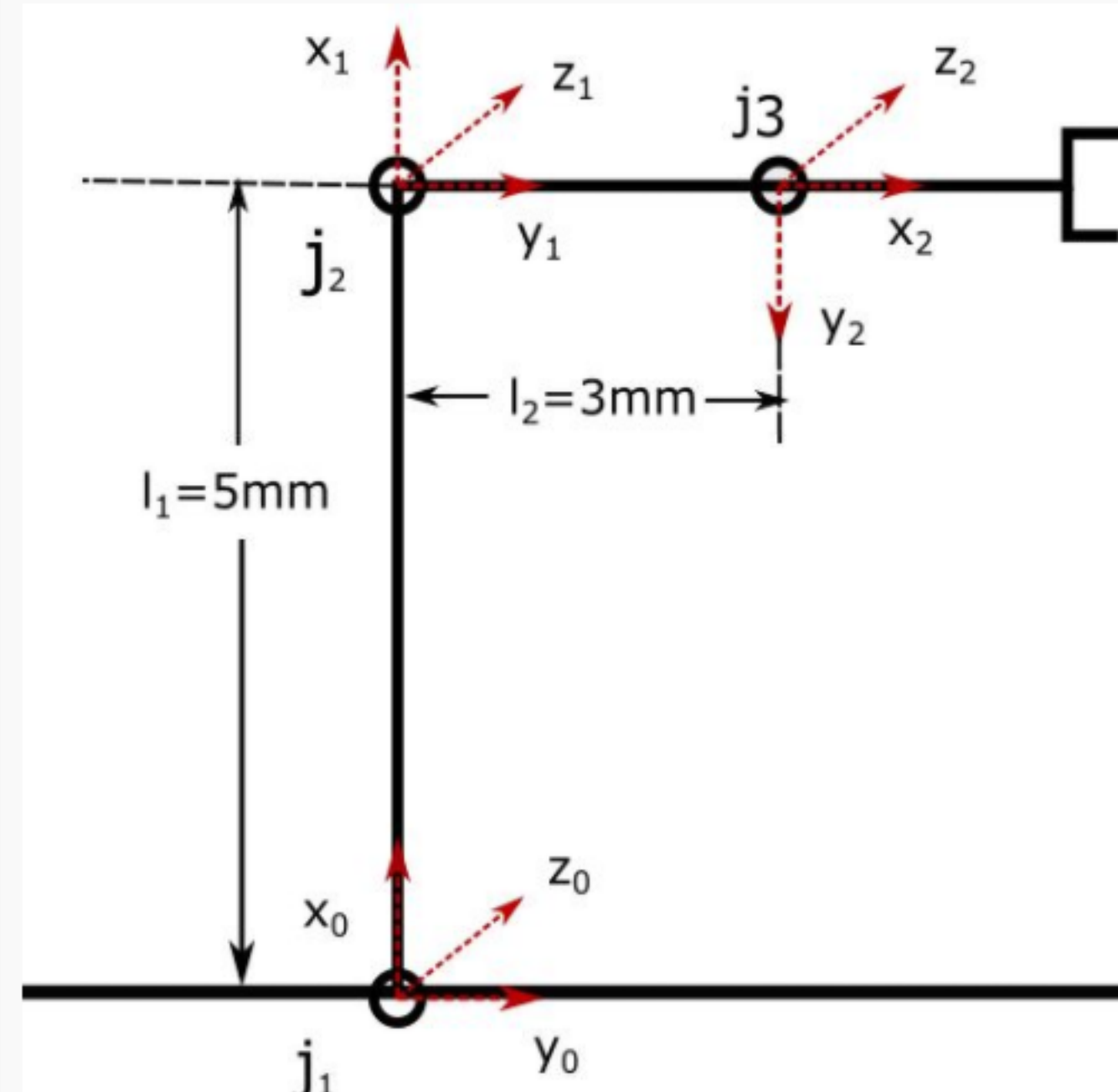
8) Consider a 6 dof serial manipulator, Which of the statements are true? (The notations used are the same as that in the lectures) 1 point

- We need 24 parameters to formulate the forward kinematics  
 if  $z^2$  is the z axis of the base frame, then  $z^3$  represents the approach vector.  
 if  $z^3$  and  $z^4$  are parallel, then  $x^4$  is found by the vector from  $L_4$  pointing away from  $z^3$   
 The joint distance  $d_2$  is the distance between  $L_2$  and  $b_2$   
 The length  $a_3$  is zero if  $b_2$  and  $L_3$  coincide

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
We need 24 parameters to formulate the forward kinematics  
if  $z^2$  and  $z^4$  are parallel, then  $x^4$  is found by the vector from  $L_4$  pointing away from  $z^3$   
The length  $a_3$  is zero if  $b_2$  and  $L_3$  coincide

Consider the 3 dof RRR planar manipulator:



With joints  $j_1$ ,  $j_2$  and  $j_3$ , the coordinate frames have been marked for you, and the link lengths have been mentioned. What is the value of  $a_1, d_1, a_2, d_2, \alpha_1, \alpha_2$ ?

9)  $a_1 =$  \_\_\_\_\_ mm

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 5

1 point

10)  $d_1 =$  \_\_\_\_\_ mm

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 0

1 point

11)  $a_2 =$  \_\_\_\_\_ mm

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 3

1 point

12)  $d_2 =$  \_\_\_\_\_ mm

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 0

1 point

13)  $\alpha_1 =$  \_\_\_\_\_ degrees

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 0

1 point

14)  $\alpha_2 =$  \_\_\_\_\_ degrees

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
(Type: Numeric) 0

1 point

15) What would the values of  $\theta_1, \theta_2$  be for the given pose of the manipulator, in Fig. 1?

- $(\theta_1, \theta_2) = (90^\circ, 90^\circ)$   
  $(\theta_1, \theta_2) = (-90^\circ, 0^\circ)$   
  $(\theta_1, \theta_2) = (0^\circ, 0^\circ)$   
  $(\theta_1, \theta_2) = (0^\circ, 90^\circ)$   
  $(\theta_1, \theta_2) = (90^\circ, -90^\circ)$

No, the answer is incorrect.  
Score: 0

Accepted Answers:  
 $(\theta_1, \theta_2) = (0^\circ, 90^\circ)$

1 point