
Week 6 - Assignment 6 - Part 1(MCQ/MSQ/NM)

The due date for submitting this assignment has passed. Due on 2021-03-03, 23:59 IST.

As per our records you have not submitted this assignment.

Instructions:

- If not explained all symbols have same meaning as in the lectures.
- Use the D-H convention followed in the course wherever mentioned.
- In some options to the MCQ/MSQ the text may not be adjacent to checkbox (circle or square). Consider the text just below it for such cases.
- Please note this week has 2 assignments : 1 online (MCQ/MSQ/NM) and 1 subjective. Total marks for the week will be calculated on the basis of both of the submissions.

---------------------------------------------------------------------------------------------------------------------------------

1) The linear velocity of the origin $O_i$ of a coordinate system $\{i\}$ with respect to $\{i\}$ is

- is always zero.
- need not be zero.

- is defined as

$$\left(\frac{\mathbf{\dot{O}_i(t+\Delta t) - O_i(t)}}{\Delta t}\right)$$

- is not defined in coordinate system $\{i\}$

No, the answer is incorrect.
Score: 0
Accepted Answers:

need not be zero.
Week6 Velocity and Static Analysis of Manipulators

- Introduction, Linear and Angular Velocity of Links (unit? unit=39&lesson=40)
- Serial Manipulator Jacobian Matrix (unit? unit=39&lesson=41)
- Parallel Manipulator Jacobian Matrix (unit? unit=39&lesson=42)
- Singularities in Serial and Parallel Manipulators (unit? unit=39&lesson=43)
- Statics of Serial and Parallel Manipulators (unit? unit=39&lesson=44)
- Lecture Slides (unit? unit=39&lesson=97)

Quiz : Week 6 - Assignment 6 - Part 1(MCQ/MSQ/NM) (assessment? name=94)

Week 7 Redundancy and resolution of redundancy, Human arm,
can be used to obtain the linear and angular velocities of links in a serial robot with rotary or prismatic joint.

is from the fixed coordinate system \( \{0\} \) to the free end \( \{n\} \) in a serial robot.

5) The Jacobian matrix for a spatial manipulator moving in 3D space

- cannot be obtained by differentiation of a vector valued function.
- is not a proper matrix as elements have different units.
- does not have a well-defined determinant.
- cannot be inverted always.

No, the answer is incorrect.
Score: 0
Accepted Answers:
cannot be obtained by differentiation of a vector valued function.
is not a proper matrix as elements have different units.

6) The Jacobian matrix for a serial robot

- contains elements which are linear functions of the joint variables.
- is a \( 6 \times n \) matrix where \( n \) is the number of joints.
- relates the linear and angular velocities of the end-effector with the joint rates.
- is the same for all coordinate systems.

No, the answer is incorrect.
Score: 0
Accepted Answers:
is a \( 6 \times n \) matrix where \( n \) is the number of joints.
relates the linear and angular velocities of the end-effector with the joint rates.

7) The Jacobian matrix for a parallel manipulator

- cannot be obtained using velocity propagation formulas.
- is not defined since there are passive joints.
- is not defined since passive joints cannot be eliminated.
- requires that the loop-closure equations are solvable.

No, the answer is incorrect.
Score: 0
Accepted Answers:
cannot be obtained using velocity propagation formulas.
requires that the loop-closure equations are solvable.

8) In a four-bar mechanism, the equivalent Jacobian matrix for the linear velocity of a chosen point on the coupler is

- is a \( 2 \times 2 \) matrix.
- is a \( 3 \times 3 \) matrix.
- is a \( 2 \times 1 \) matrix.
- is a scalar.

No, the answer is incorrect.
Score: 0
Accepted Answers:
is a \( 2 \times 1 \) matrix.

9)
In the case of the 3-RPS parallel manipulator with $\sum_{i=1}^{3} \dot{q}_i^2 = 1$ the tip of the linear velocity vector of the centroid of the moving platform

- lies in a plane.
- lies on an ellipse in 3D space.
- lies on an ellipsoid.
- lies on an ellipsoid if the 3-RPS is not at a singular configuration.

No, the answer is incorrect.
Score: 0
Accepted Answers:
lies on an ellipsoid.

10) At a singular configuration, a serial manipulator

- looses one or more degrees of freedom.
- can loose all its degrees of freedom.
- can move in some directions only.
- cannot apply force in any direction.

No, the answer is incorrect.
Score: 0
Accepted Answers:
looses one or more degrees of freedom.
can move in some directions only.

11) At a gain singular configuration, a parallel manipulator

- gains one or more degrees of freedom instantaneously.
- becomes instantaneously locked completely.
- can instantaneously move in some direction only.
- cannot resist force in any direction.

No, the answer is incorrect.
Score: 0
Accepted Answers:
gains one or more degrees of freedom instantaneously.
can instantaneously move in some direction only.

12) At a gain singular configuration in a parallel manipulator, the constraint equations

- used to obtain the passive joint variables are independent.
- used to obtain the passive joint variables are dependent.
- cannot be used to find the passive joint rates.
- cannot be differentiated.

No, the answer is incorrect.
Score: 0
Accepted Answers:
used to obtain the passive joint variables are dependent.
cannot be used to find the passive joint rates.