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Unit 2 - Week 1

Assignment 1

The due date for submitting this assignment has passed. **Due on 2020-02-12, 23:59 IST.**

Assignment submitted on 2020-02-08, 14:19 IST

1) Degree of Freedom for a rigid body in space is: ***1 point***

- Three
- One
- Six
- Four

Yes, the answer is correct.
Score: 1
Accepted Answers:
Six

2) Which of the following quantities not taken into account for Kinematics of a rigid body? ***1 point***

- Position
- Velocity
- Acceleration
- Torque

Yes, the answer is correct.
Score: 1
Accepted Answers:
Torque

3) Two vectors are orthonormal if: ***1 point***

- (•) Their cross product is zero.
- ( ) Their dot product is zero.
- ( ) Their cross product is one.
- ( ) Their dot product is one.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Their dot product is zero.

4) Select True or False: ***1 point***

Statement: While performing successive translations and rotation , we can change the sequence of Homogeneous transformations.

- (•) True
- ( ) False

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

5) Consider following differential coordinate transformation Matrix represented by vectors n, o, a and p. Which of the following is not true? ***1 point***

$$T = \begin{bmatrix} n_x & o_x & a_x & p_x \\ n_y & o_y & a_y & p_y \\ n_z & o_z & a_z & p_z \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- ( ) $n \times o = a$
- ( ) $a \times n = o$
- ( ) $o \times a = n$
- (•) $a \times o = n$

Yes, the answer is correct.
Score: 1
Accepted Answers:
$a \times o = n$

6) In case of Inverse Kinematics: ***1 point***

- ( ) Base frame position and orientation known; find end-effector position and orientation
- ( ) Joint Variables values known; find end-effector position and orientation.
- (•) End -Effector position and orientation known; find values of joint variables.
- ( ) End-Effector position and orientation known; find base frame position and orientation.

Yes, the answer is correct.
Score: 1

Accepted Answers:
End -Effector position and orientation known; find values of joint variables.

7)A triangle with coordinates A(0,0), B(4,0) and C(2,2) rotated about z-axis by 90^0 anticlockwise, now triangle will be described by: ***1 point***

- A(0,0),B(2,-2),C(0,4)
- A(0,0),B(-2,2),C(0,4)
- A(0,0),B(0,4),C(-2,2)
- A(0,0),B(0,-4),C(2,-2)

Yes, the answer is correct.
Score: 1

Accepted Answers:
A(0,0),B(0,4),C(-2,2)

8) Let F be the coordinate frame with $\vec{i}, \vec{j}, \vec{k}$ as the coordinate axes and M be the coordinate frame with $\vec{k}, \vec{j}, -\vec{i}$ as its coordinate axes. Suppose the coordinates of point p with respect to frame M are ${}^{M}[p] = [2, 1, 3]^T$. What are the coordinates of p with respect to fixed frame F. ***1 point***

- $[-3, 1, 2]^T$
- $[3, 1, 2]^T$
- $[2, 1, 3]^T$
- $[-2, 1, 3]^T$

Yes, the answer is correct.
Score: 1

Accepted Answers:
$[-3, 1, 2]^T$

9) If the work space of a 3 dof manipulator is a cylinder, then its configuration is given by: ***1 point***

- PPP
- RRP
- RPP
- RRR

Yes, the answer is correct.
Score: 1

Accepted Answers:
RPP

10)If the matrix for a general rotation about a unit vector angle θ is given by ***0 points***

$$\begin{bmatrix} \frac{1}{\sqrt{3}} & -\frac{1}{\sqrt{2}} & \frac{1}{\sqrt{6}} \\ \frac{1}{\sqrt{3}} & \frac{1}{\sqrt{2}} & \frac{1}{\sqrt{6}} \\ \frac{1}{\sqrt{3}} & 0 & -\frac{2}{\sqrt{6}} \end{bmatrix}$$

Then approximate value of cosθ will be:

- 0.467
- 0.934
- 0
- 0.783

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.467