INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

ASSIGNMENT QUESTIONS

Course Name	:	**ROBOTICS**
Course Code	:	**A70355**
Class	:	IV B. Tech I Semester
Branch	:	**MECHANICAL ENGINEERING**
Year	:	2018 – 2019
Course Faculty	:	Mr. A. Anudeep Kumar, Assistant Professor

COURSE OBJECTIVES

The objective of the course is to enable the student in;

I. Understanding basic concepts of robots and their development.

II. To know various configuration of robots used in industry, role of robots in industrial automation.

III. Analyze the forces acting on gripper and selection and design of grippers, actuators and sensors.

IV. Transformation of motion of robot end effectors with Denavit and Hartenberg parameters.

V. Euler-Lagrange and Newton-Euler equations of motion are used for finding force and torque required at each of the joint actuators.

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	ASSIGNMENT-I		
1.	a. Define the term Robot as per RIA. b. Define work envelope? Draw configurations and work space of cylindrical and spherical robots.	Remember	1
2.	a. Discuss the types of grippers with the help of neat sketches. Discuss the factors considered in the design and selection of grippers. b. Distinguish between proximity and tactile sensors used in Robotic applications.	Remember	2
3.	a. Draw configurations and work space of Cartesian and SCARA robots. b. Discuss the position and orientation of a robot? Explain RPY representation of orientation	Remember	3
4.	a. What the homogeneous transformation matrix for a rotation of 90^0 about the z-axis, followed by a rotation of 90^0 about the x-axis, followed by a translation of (3,7,9) b. For a planar RR manipulator, derive the Jacobean matrix and find the linear velocity and angular velocity of the end effector.	Remember	4
5.	a. What is Geometric Jacobian? Explain. b. Find the Jacobian matrix of a planar two link revolute jointed manipulator.	Understand	2

S. No.	Question	Blooms Taxonomy Level	Course Outcomes
	ASSIGNMENT – II		
1.	a. What are the advantages and disadvantages of magnetic grippers? Explain the two categories of magnetic grippers. b. Explain the factors in gripper selection and design.	Understand	2
2.	a. What do you mean by Homogeneous co-ordinates? b. For the point 2i-3j+7k perform the following operations? i. Rotate 60 about the OY axis ii. Then translate 10 units along OZ axis	Understand	5
3.	a. Discuss the D-H symbolic notation and explain the D-H method of assignment of co-ordinate frames. b. Using the link parameter find the T matrix representing the position and orientation of the link i.w.r.t adjacent link i-1	Understand	2
4.	a. What is a geometric jacobian? Explain. b. Derive jacobian matrix for cylindrical robot.	Remember	3
5.	a. Derive the expressions for joint torques of a planar R-R manipulator by using Lagrange-Euler formulations	Remember	5

Prepared by:
Mr. A. Anudeep Kumar, Assistant Professor

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