R09

Code No:09A70305

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, May/June - 2013
Robotics
(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks

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1.a) What are the considerations in gripper selection and design. Explain?
b) What are the advantages and disadvantages of magnetic grippers? Explain the two categories of magnetic grippers. [7+8]

2.a) A Cartesian coordinate Robot is to move its three axes from position (x, y, z)= (4, 4, 6) to position (x, y, z) = (10, 15, 10). The maximum velocity for the three joints are, respectively 250 mm/sec, 300 mm/sec and 200 mm/sec. Determine the time required to move each joint if slew motion is used.
b) Find expressions for the joint motion parameters by using cubic polynomial fit in joint space scheme. Use the following data: Θ_0=20, Θ_f=50 t=3sec. [7+8]

3.a) Find the composite rotation matrix that represents a rotation of Θ angle about OZ axis followed by a rotation of Ø angle about OV axis followed by a rotation of α angle about the OW axis.
b) Explain the Roll pitch and yaw angle system. [7+8]

4. The link parameter table of a SCARA robotic manipulator is given below
Find the Jacobian matrix of the manipulator.
Table: Link parameter table of SCARA Robot [15]

AXIS	Θ	d	a	A
1	Θ_1	d_1	a_1	180^0
2	Θ_2	0	a_2	0
3	0	d_3(variable)	0	0
4	Θ_4	d_4	0	0

5. Derive the expressions for joint torques of a planar R-P manipulator by using Lagrange – Euler formulations. [15]

6.a) Explain the working of DC Servo Motor.
b) Discuss the principle of a Resolver. [7+8]

7.a) What are the considerations of Robots in processing applications ?
b) What are the features of robot in machine loading and unloading applications? [7+8]

8. Find the Jacobian matrix of a planar two link revolute jointed manipulator.[15]

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