R09

Code No: D0404

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS MARCH/APRIL 2011
INDUSTRIAL ROBOTICS
(CAD/CAM)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks
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1. a) Explain briefly about the three types of automation.
   b) Explain the two important characteristics of dynamic performance. [12]

2. a) Explain the working principle of potentiometer and digital encoder.
   b) Explain about the power transmission systems employed in industrial robotics. [12]

3. a) Explain the three common types of motion that a robot manipulator can make in traveling from point to point.
   b) A Cartesian co-ordinate robot is to move its three axis from position (x,y,z)=(0,5,5) to position (x,y,z)=(20,35,15). All the distances measures in cms. The maximum velocities for the three joints are, respectively, 20 cm/sec, 1cm/sec, and 10 cm/sec. [12]
   i) Determine the time required to move each joint if slew motion is used
   ii) Determine the time required to move the arm and the velocity of each joint, if the joint interpolation is used. [12]

4. a) The following table is the link parameter table of spherical robotic manipulator

Link parameter table

Link	a	α	θ	d
1	0	+90°	θ_1	0
2	0	-90°	θ_2	0
3	0	0	0	d_3

Find the set of joint displacements to move to the position

$T_3 =$

n_x	o_x	a_x	p_x
n_y	oy	a_y	P_y
n_z	o_z	a_z	p_z
0	0	0	1

[12]

Contd….2

5. a) Explain the working of the magnetic and vacuum cup grippers.
   b) Discuss about the proximity sensors. [12]

6. a) Explain the capabilities and limitations of lead through programming
   b) Discuss the generations of robot programming languages. [12]

7. a) What are the general considerations in robot work cell design.
   b) Discuss about work cell control. [12]

8. a) What are the features of the spray painting robot?
   b) Discuss briefly about the robot inspection. [12]

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