Con. 5817-09. (All Branch) BE-(~~ETRX~~) Sem VIII SP-6800

17/12/09

(3 Hours) [Total Marks : 100

Lib Robotics

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data wherever **required**.

1. (a) Compare the five basic robot configuration according to the work envelope and applications. 5
(b) Explain Reach and Stroke of a robot. 5
(c) Discuss Total Work Envelope (TWE) and Dexterous Work Envelope (DWE) of two axis articulated planar robot. 5
(d) Compare area descriptor and line descriptor. 5

2. (a) Explain the significance of TCV vector in the solution of Inverse Kinematic. 5
(b) Discuss the general properties of the solutions of the Inverse Kinematic. 5
(c) Develope IK analysis of 2-axis planar articulated robot. 10

3. (a) Explain D-H algorithm. Develope the D.K. analysis of 4 axis SCARA robot. 15
(b) Explain screw Transformations. 5

4. (a) Define Joint space work envelope (JSWE) and Tool Trajectory. 5
(b) Explain work space fixtures required in the robotic work cell. 5
(c) Discuss work envelope of a four axis SCARA robot. 10

5. (a) Explain how straight line motion can be obtained using an articulated robot. 10
(b) Explain linear interpolation with parabolic blends. Discuss its advantages over piecewise linear interpolation. 10

6. (a) Discuss edge detection technique. Explain the significance of edge threshold $\in$. 10

(b) 10

0	0	1	1	0	0
1	1	1	1	1	1
0	0	1	1	0	0

For the above image shown calculate area, centroid, first order moments, second order moments, central moments and principal angle.

7. Write short notes on the following :– 20
(a) Region growing and region labelling
(b) Shrink and swell operator
(c) Task planning problem
(d) NC and CNC machines.