Code :R5321305

R5

III B.Tech II Semester(R05) Supplementary Examinations, April/May 2011
ROBOTICS & AUTOMATION
(Electronics & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) By means of a sketch, show the relationship of fixed, programmable and flexible automation as a function of production volume and product variety. Distinguish between the fixed and flexible automation.
   (b) Discuss in detail the play back robots with point to point control and continuous path control.
2. Explain the principle of working of optical proximity sensors with the help of neat sketches.
3. Discuss the performance of a closed loop second order control system.
4. Draw the control circuit of two d.o.f planar robot with hydraulic actuator control circuit and explain the procedure.
5. (a) Find the inertia matrix for a right circular cylinder of radius r, height h and total mass M, of uniform density.
   (b) Explain the Newton-Euler formulation for the manipulator dynamics.
6. Obtain the D-H link parameters for the three-dimensional three degrees of freedom manipulator shown in Figure 6. Find the homogeneous transformation matrix that describes the position and orientation of the end of arm with respect to the base frame.

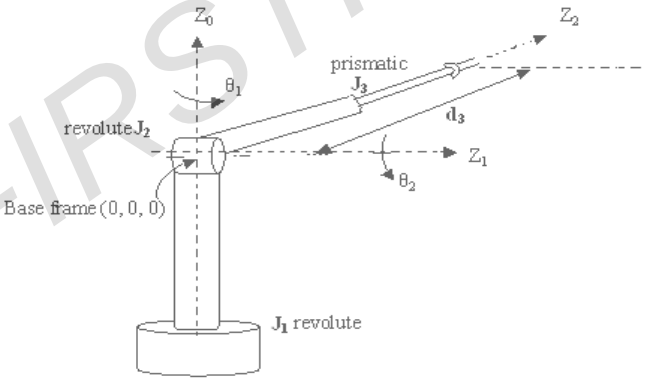

Figure 6

7. (a) What are the characteristics of robot task-level languages? Explain.
   (b) Explain the different algorithms for planning collision-free path of a robot.
8. (a) What are the general considerations in robot material handling? Explain?
   (b) What are the problems encountered in applying robots to forging and related operations?

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