

Code: AE5T6FE1, IT5T5FE2, CS5T5FE3, EE5T6FE3, EC5T6FE5, EM5T6FE2

III B.Tech - I Semester – Regular Examinations – November 2015

ROBOTICS

(Common for AE, IT, CSE, EEE, ECE, ECM)

Duration: 3 hours

Max. Marks: 70

Answer any FIVE questions. All questions carry equal marks

1. a) Describe the relation between automation and robotics. 7 M
b) Classify the robots by control systems. Explain them. 7 M
2. a) Briefly discuss about mechanical grippers. 7 M
b) Explain the working principle of Stepper motor. 7 M
3. Determine the homogeneous transformation matrix to represent the following the sequence of operations: 14 M
 - i) Rotation of 60^0 about x-axis
 - ii) Translation of -4 units along x-axis
 - iii) Translation of 6 units along z-axis
 - iv) Rotation of 45^0 about y-axis.
4. a) Define the four joint-link parameters with reference to D-H convention. 7 M

- b) Derive the forward kinematics equation using the D-H convention for the RR planar manipulator. 7 M
5. Explain the Lagrange-Euler formulation to derive dynamic model of a manipulator. 14 M
6. A single cubic trajectory is given by $\theta(t) = 10 + 5t + 70t^2 - 45t^3$ and is used over the time interval from $t=0$ to $t=1$. What are the starting and final positions, velocities and accelerations? 14 M
7. Define a sensor and discuss about various types of position sensors. 14 M
8. Explain use of Robots in the fields of welding and painting. 14 M