

Code No: 57026

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech IV Year I Semester Examinations, November - 2015

ROBOTICS

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) What is the End effectors and how can it be used for Robot operations?
b) Explain the classification of robots according to their control systems. [7+8]
- 2.a) What are Euler angles? Explain about Roll Pitch and Yaw System.
b) Rotate the vector $3i+5j+2k$ about X axis by 45° and then translate along Z axis by 5 units. [7+8]
- 3.a) Discuss the D-H symbolic notation and explain the D-H method of assignment of co-ordinate frames with the help of an example.
b) Derive the 4×4 D-H transformation matrix and discuss its characteristics. [8+7]
4. Derive the Jacobian matrix of planar two link R-P manipulator and discuss the importance of Jacobian matrix. [15]
- 5.a) Using the Newton-Euler formulation find the Linear acceleration for revolute joint.
b) Derive the expressions for joint torques/forces of a planar R-P manipulator by using Lagrange-Euler formulation. [7+8]
- 6.a) Explain about joint interpolated motion.
b) Using cubic polynomial fit in joint space scheme with a via point develop the expressions for motion parameters. [7+8]
- 7.a) Explain the working principle of stepper motor along with practical applications.
b) Discuss about any one type of tactile sensor. [8+7]
8. Explain the following:
a) Magnetic gripper
b) Resolver
c) Homogeneous transformation matrix representing global scaling. [5+5+5]

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