

Code No: 57026

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2017

ROBOTICS

(Mechanical Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) Describe the relation between automation and robotics.
b) Discuss briefly the various design considerations of grippers. [7+8]
- 2.a) Explain briefly about Euler angles.
b) For the point $(3i+7j+5k)$, perform the following operation. Translate 6 units along Y and then rotate 30° about X. [7+8]
3. Write and explain the algorithm for deriving the forward kinematics for any manipulator based on D-H convention. [15]
- 4.a) What is dynamic modeling?
b) Find the joint space singularities of the cylindrical coordinate robot. Describe the self-motion of the manipulator out singularities if present. [7+8]
5. Establish the dynamic model of a one-axis robot with Lagrangian-Euler formulation. [15]
- 6.a) Differentiate between path planning and trajectory planning.
b) The trajectory of a particular joint is specified as follows, path points in degrees 10, 35, 25 and 10. The duration of these three segments should be 2,1,3 seconds respectively. The magnitude of the default acceleration to use at all blend points is 50 degrees/sec^2 . Calculate all segment velocities, blend times and linear times. [7+8]
- 7.a) Explain the working and function of potentiometer with neat sketch.
b) What is the resolution in degrees, of an encoder with 12 tracks? [8+7]
- 8.a) Explain the use of robots in assembly operations.
b) Describe the material handling operations performed by robot. [7+8]

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