JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, March - 2021
ROBOTICS
(Common to ME, MSNT)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks
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1.a) What are the speed capabilities and load carrying capacity of the current industrial robots.　　[8+7]
  b) What are the capabilities and limitations of an end effector?

2.a) What are the three degrees of freedom associated with the arm and the body?
  b) How repeatability and compliance measures the precisions of the robot's movement? [7+8]

3.a) How the equivalent angle axis is represented?
  b) A position vector $v = 4i + 3j + 2k$ is rotated by 30^0 about Y axis, followed by rotation about Z axis by 60^0, followed by rotation about X axis by 45^0, followed by translation of +3 units in Z direction. Find the final homogeneous transformation matrix of v.　　[7+8]

4. Explain the DH matrix representation for a Stanford robot by establishing link coordinate system.　　[15]
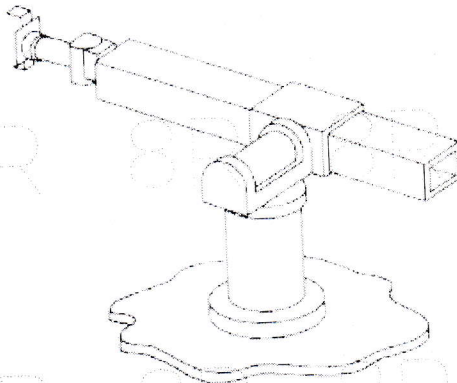
5.a) Describe the features of prismatic and rotary joint jacobians.　　[8+7]
  b) Discuss about the forward differential motion model.

6.a) Describe the features of electric actuators.　　[7+8]
  b) Explain the working principle of encoders.

7.a) What are the applications of resolvers.　　[7+8]
  b) Discuss about any two tactile sensors.

8.a) Discuss various machine loading and unloading operation for machining process.　　[8+7]
  b) What are the basic three categories of robotic inspection system?

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