Code No: 117HA **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

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

ROBOTICS

(Common to ME, AME)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Part- A (25 Marks)

1.a)	Define Degrees of Freedom.	[2]
b)	What are the different types of control modes in a robot system?	[3]
c)	What is joint coordinates?	[2]
d)	What is the difference between forward and inverse kinematics?	[3]
e)	Define manipulator.	[2]
f)	Discuss about planar two link manipulators.	[3]
g)	What is trajectory planning?	[2]
h)	Explain about application of encoders.	[3]
i)	Describe the role of robot in inspection.	[2]
j)	Explain about robot cell layout design.	[3]

Part-B (50 Marks)

2.a) What is Robotics? Explain the various components involved in Robotic System with block diagram.

b) Explain the classification of robots by different controlling methods. [5+5]

OR

3.a) With a neat sketch explain the magnetic gripper and List its advantages and limitations.

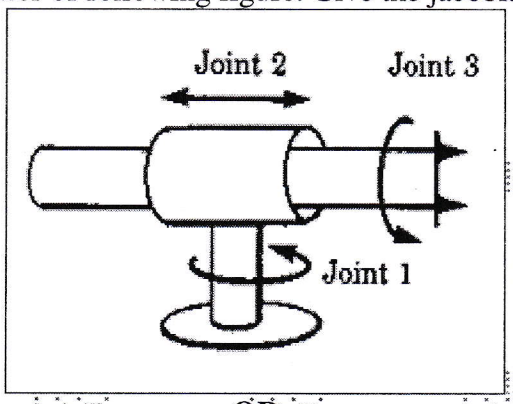
b) How the robot end effector interface is achieved. Explain. [5+5]

4. Find the rotation matrix for a rotation of 30^0 about the OZ axis followed by a rotation of 60^0 about OX axis, followed by a rotation of 90^0 about OY axis. [10]

OR

5. Derive the inverse kinematics of the 3-DOF manipulator by considering an example. [10]

6. Give that 3×3 jacobian which calculates linear velocity of the tool tip from the three joint rates for the manipulator of following figure. Give the jacobian in frame {0}. [10]



OR

7. Using Lagrange Euler formulations determine the equation of motion for the RP manipulator. [10]

8. What are the considerations that are made while planning a joint interpolated motion trajectory? Explain. [10]

OR

9. Explain various feedback components used for robot operation. [10]

10. Explain the various applications of robot in manufacturing and explain how the robots are handling materials in a shop floor. [10]

OR

11. Write a short note on following:
a) Work volume
b) General considerations of Robot in Material Handling. [5+5]

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