Code No: 137GR

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year I Semester Examinations, July/August - 2023
ROBOTICS
(Mechanical Engineering)

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

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A
(25 Marks)

1.a)	What is repeatability?	[2]
b)	Describe the robot architecture with neat sketch.	[3]
c)	What is motion interpolation?	[2]
d)	Explain the properties of transformation matrix.	[3]
e)	What is jacobians means?	[2]
f)	Discuss about path planning.	[3]
g)	Define actuator.	[2]
h)	With neat sketch explain about encoders.	[3]
i)	What are the features of robot welding?	[2]
j)	How material loading and unloading is performed using robotics?	[3]

PART – B
(50 Marks)

2.a) Define automation. Explain the different components of robotic system.
b) Explain the industrial and non-industrial applications of robotics. [5+5]

OR

3.a) Explain the precision movements of robot compare to human movements.
b) What are the design requirements of robot end effector? Explain. [5+5]

4.a) Explain the construction of various types of manipulators in Robotics.
b) A point P = [2 3 4] T is attached to a rotating frame. The frame rotates 900 about the X-axis of the reference frame. Find the new coordinate frame after the rotation. [5+5]

OR

5. Explain D-H parameters in detail and derive the matrix for forward transformation. [10]

6. Derive the Jacobian matrix for velocity and angular velocity of six joint Robot. [10]

OR

7. Explain about trajectory planning and avoid obstacles with an industrial example. [10]

8.a) Discuss the role of stepper motor in robot.

b) Explain differences between pneumatic and hydraulic drive systems. [5+5]

OR

9.a) Explain how force sensors are employed in robots.

b) What are the various applications of range sensors? Explain. [5+5]

10. With practical industrial example, explain how robots are helping in material transfer applications. [10]

OR

11. Explain the applications of robot in high temperature inspection and assembly. [10]

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