

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2018****Subject Code: 2182002****Date: 29/11/2018****Subject Name: Automated Manufacturing - II****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1**
- (a) Define robot. Write down application of robot. **03**
- (b) Difference between accuracy and precision in a robotic manipulator. **04**
- (c) Consider Schematic of a Cylindrical robot with spherical wrist manipulator with a base frame and end-effector frame shown in figure 1. Using D-H notation Construct
1. Set of robotic coordinate frame
  2. A table for joint parameter
  3. Each joint individual matrix

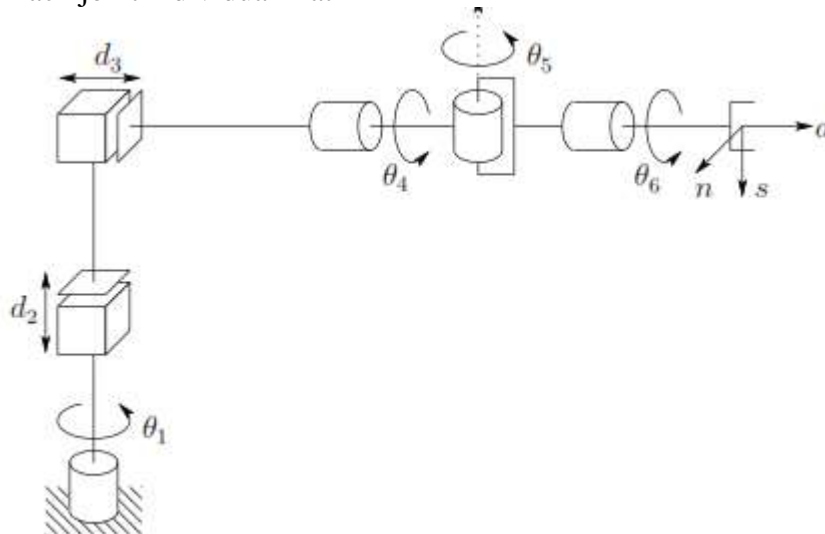


Figure 1. Cylindrical robot with spherical wrist manipulator

- Q.2**
- (a) Define work volume and load carrying capacity of robot. **03**
- (b) Explain in details vacuum and adhesive gripper in robot. **04**
- (c) List and explain six end effector attachment.in robot. **07**
- OR**
- (c) A point P  $(8, 3, 2)^T$  is attached to a frame  $(n, o, a)$  and is subjected to the transformations described. Find the coordinates of the point relative to the reference frame at the conclusion of transformations. Also plot the coordinates in graphically. **07**
- (1) Rotation of  $90^0$  about the y-axis,
  - (2) Followed by a rotation of  $90^0$  about the x-axis,
  - (3) Followed by a rotation of  $90^0$  about the z-axis
  - (4) Followed by a translation of  $[4,-3,7]$
- Q.3**
- (a) Derive the matrix that represents a pure translation about the reference frame. **03**
- (b) Differentiate forward and inverse kinematics. **04**
- (c) Consider the reverse transformation of a two joint manipulator shown in fig.1. **07**  
Given the Length of the joint 1,  $L_1=15\text{cm}$ , the length of joint2,  $L_2=20\text{cm}$ , end

effector position  $x=11.5\text{cm}$  and  $y=14.5\text{cm}$ , compute the joint angle  $\theta_1$  and  $\theta_2$  for robot.

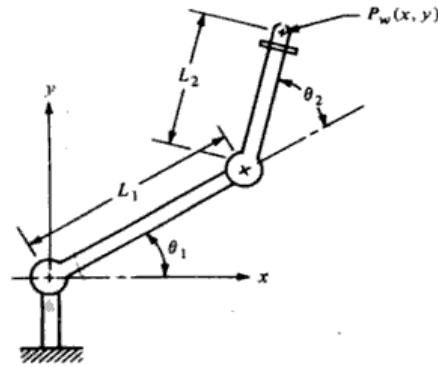


fig.2 Two joint robot manipulator

**OR**

- Q.3** (a) Explain about importance of Robot Programming lead through programming. **03**  
 (b) Sketch a **TLL**, **TRL** and **RRR** configuration of a robot. **04**  
 (c) Explain a moving baseline tracking system and a stationary baseline tracking system in robot cell layout. **07**

- Q.4** (a) Differentiate the flexible automation and fixed automation. **03**  
 (b) Explain with neat a sketch the optical proximity sensors. **04**  
 (c) Explain the rank order clustering techniques to the part-machine incidence matrix. **07**

**OR**

- Q.4** (a) Explain the poly code in group technology. **03**  
 (b) Explain different types of MRP inputs and output of systems. **04**  
 (c) Five machines will constitute a GT machine cell. The From-To Data for the machines are shown in the table below. **07**
- (a) Determine the most logical sequence of machines for this data according to Hollier method –I and construct the flow diagram for the data.  
 (b) Repeat step (a) using Hollier method – II  
 (c) Compute the percentage of in sequence moves and percentage of backtracking moves in the solution for the two methods.

From	To				
	1	2	3	4	5
1	10	10	80	0	0
2	0	0	0	85	10
3	0	10	0	10	0
4	60	0	10	0	0
5	0	75	0	20	10

- Q.5** (a) Differentiate between material requirement planning and capacity requirement planning. **03**  
 (b) Explain four basic components of flexible manufacturing system. **04**  
 (c) Explain in details MRP-II techniques. **07**

**OR**

- Q.5** (a) Explain Production Flow Analysis (PFA). **03**  
 (b) Define the master production scheduling. Explain the factors that need to be taken into account while developing master production schedule **04**  
 (c) Explain the nature and role of the elements of the CIM system. **07**

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