

**GUJARAT TECHNOLOGICAL UNIVERSITY**

BE - SEMESTER-VIII (old) - EXAMINATION – SUMMER 2017

Subject Code:182002

Date:29/04/2017

Subject Name: Automated Manufacturing II

Time:10:30 AM to 01:00 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)** Consider Cartesian manipulator with spherical wrist shown in figure 1. Where, P is the end effector position. Using D-H notation Construct **07**
1. Set of robotic coordinate frame
  2. A table for joint parameter
  3. Each joint individual matrix

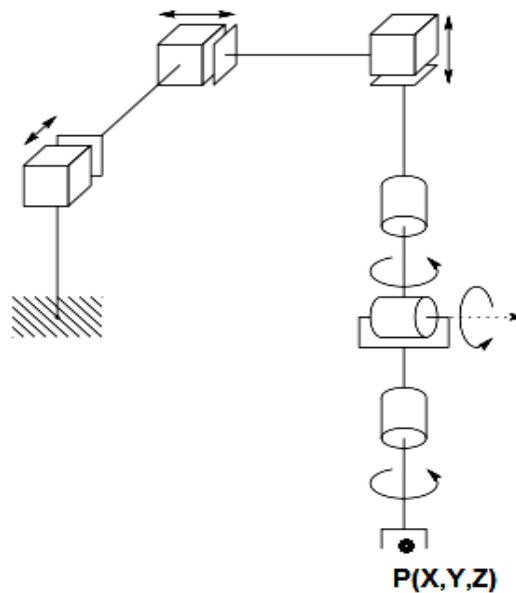


Figure 1. Cartesian manipulator with spherical wrist

- (b)** Discuss the difference between spherical and articulated arm configuration. **07**
- Q.2 (a)** A point  $P(10,8,4)^T$  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. **07**
- (1) Rotation of  $90^\circ$  about the a-axis,
  - (2) Followed by a rotation of  $90^\circ$  about the o-axis,
  - (3) Followed by a translation of [9,-3,4]
- (b)** What is an end effector? Which factor is considering design the end effector? **07**
- OR**
- (b)** What is difference between powered leadthrough and manual leadthrough in robot programming? **07**
- Q.3 (a)** Explain in details tactile and touch sensors in robotic system and state their application **07**
- (b)** Explain four basic components of flexible manufacturing system. **07**
- OR**
- Q.3 (a)** Difference between accuracy and repeatability in a robotic manipulator. **07**
- (b)** Explain different types industrial application of robot. **07**

**Q.4 (a)** 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.
- (d) Which method is better according to these measures? Suggest a suitable type of layout for the solution obtained by both the 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

(b) What are the advantages and limitations of flexible manufacturing system? **07**

**OR**

**Q.4 (a)** Apply the rank order clustering techniques to the part-machine incidence matrix in the table that follows to identify logical part families and machine groups. Parts are identified by letters and machines are identified numerically. **07**

Parts	Machines				
	1	2	3	4	5
1	×		×		×
2	×	×		×	×
3	×	×		×	×
4	×	×		×	×
5	×		×		×
6			×		×
7	×		×		×
8	×			×	×
9	×	×		×	
10	×	×		×	

(b) Discuss briefly different type of flexibility used in FMS **07**

**Q.5 (a)** Explain the following term in GT: (1) mono code (2) poly code (3) mixed code. **07**

(b) What is CIM? What are the benefits and limitations of CIM? **07**

**OR**

**Q.5 (a)** Differentiate between material requirement planning and capacity requirement planning. **07**

(b) Discuss the computerized elements of CIM systems and explain the briefly the advantage that will be gained by implementation of CIM. **07**

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