Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII EXAMINATION – SUMMER 2016

Subject Code:182002 **Date:05/05/2016**

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 Elbow manipulator with spherical wrist shown in figure 1. Using D-H notation Construct **07**

1. Set of robotic coordinate frame
2. A table for joint parameter
3. Each joint individual matrix

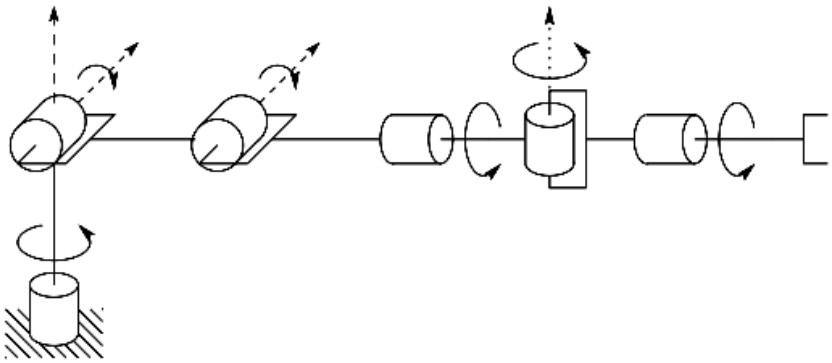

Figure 1. Elbow manipulator with spherical wrist

(b) Illustrate the different types of the gripper used in industrial robot with specific application example of each. **07**

Q.2 **(a)** Sketch a TRR, TRL and TLL configuration of a robot. Also give one application of each. **07**

(b) Differentiate the forward kinematics and inverse kinematics. **07**

OR

(b) Explain the significance of the following for a robot. **07**

1. Speed of response.
2. Work volume.
3. Repeatability.

Q.3 **(a)** A point $P(10,6,2)^T$ 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 transformation in graphically. **07**

1. Rotation of 90^0 about the o-axis,
2. Followed by a rotation of 90^0 about the n-axis,
3. Followed by a translation of [6,-2,4]

(b) Describe the requirements of sensors in robots. **07**

OR

Q.3 **(a)** Evaluate the following statements: **07**

1. Repeatability is greater than the accuracy in a robot.
2. Double grippers are the subset of multiple grippers.

(b) What are the various type of layouts used in FMS design? Explain briefly their applications. **07**

Q.4 **(a)** The following table gives the information regarding the parts and the machines on which they are to be processed. **07**

1. Determine the similarity coefficients between all the machines.
2. Use Single Linkage Cluster analysis method and develop a dendrogram.
3. Identify the cell configurations in a similarity range of 0.5 – 0.8.
4. How will you resolve the problem of exceptional elements?

Parts	**Machines**				
	A	B	C	D	E
1	1		1		1
2	1	1		1	1
3	1	1		1	1
4	1	1		1	1
5	1		1		1
6			1		1
7			1		1
8	1			1	

(b) Basic Structure of the Opitz Parts Classification and Coding System. **07**

OR

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) "FMS is a sophisticated type of GT cell." Evaluate. In what aspects FMS is really flexible? **07**

Q.5 **(a)** What are the advantages and limitations of group technology? **07**

(b) Define master production scheduling. Explain the factors that need to be taken into account while developing master production schedule. **07**

OR

Q.5 **(a)** Explain the following **07**

1. MRP- II
2. Master production schedule(MPS)

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

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