

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2017****Subject Code: 2182002****Date: 07/11/2017****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) Describe briefly the various components in a robot. **03**
- (b) What is robot anatomy? Discuss with neat sketch, various joints in robot. **04**
- (c) Consider 6-DOF Robot manipulator shown in figure 1. Using D-H notation **07**
Construct
1. Set of robotic coordinate frame
 2. A table for joint parameter
 3. Each linear joint individual matrix

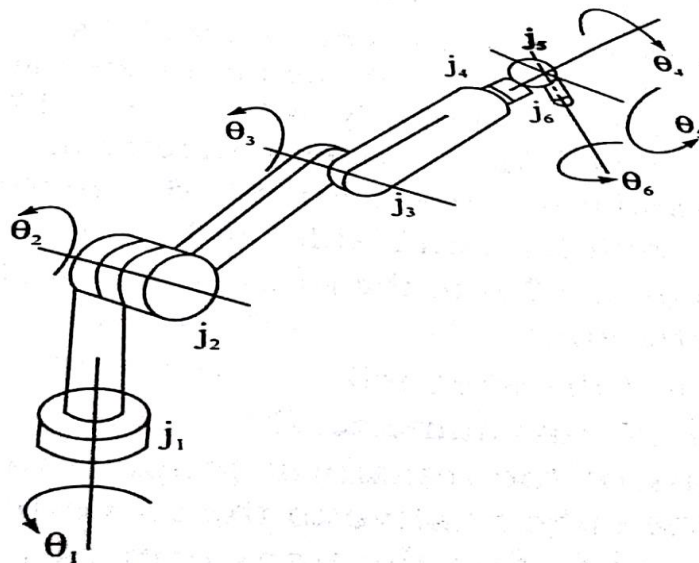


Figure 1. 6-DOF Robot manipulator

- Q.2**
- (a) Explain with sketch three orientation axes of wrist. **03**
- (b) Define robot and its future application. **04**
- (c) Why robot is called 24x7 worker? What is major advantage of a robot? **07**
- OR**
- (c) Sketch the work envelopes of the robot configurations for each of the five types of manipulators. **07**
- Q.3**
- (a) Evaluate “Accuracy is an absolute concept, repeatability is relative”. **03**
- (b) Evaluate “Double grippers are the subset of multiple grippers”. **04**
- (c) Consider the manipulator shown in figure 2. Calculate $P(x, y, z)$ for the manipulator. Given specification of following parameters, the length of link $L_1=10\text{in}$, length of extension link $L=15\text{in}$, the length of link $L_4=3\text{in}$, the base angle $\theta=0^\circ$, the elevation angle $\Phi=20^\circ$, and the pitch angle $\Psi=34^\circ$. **07**

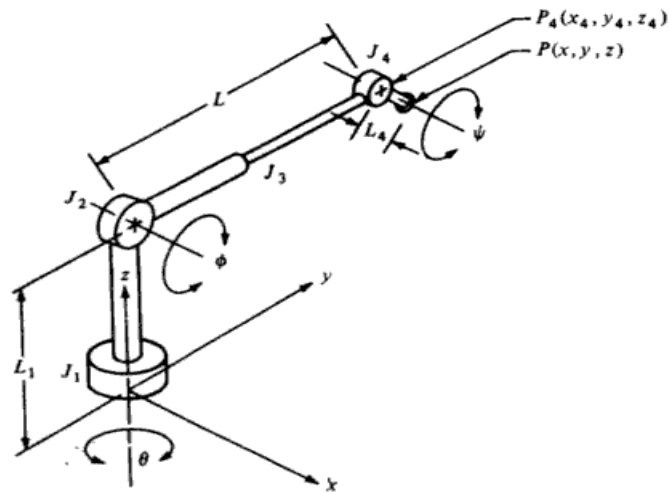


Figure 2. 3-Dimensional 4 degree of freedom manipulator.

OR

- Q.3** (a) Evaluate “Load carrying capacity specified under the condition of robot’s arm is its weakest position”. **03**
- (b) Explain in briefly four types of robot control systems. Out of these which method of motion control would be the best for spray painting by robot? **04**
- (c) A frame B was moved along its own n-axis a distance of 5 units and then rotated about its o-axis an angle of 60^0 , followed by a rotation of about the Z-axis; it was then translated about it’s a-axis 3 units and finally rotated about x-axis 45^0 . **07**
- (i) Calculate the total transformation performed.
- (ii) What angle and movements would we have to make if we were to create the same location and orientation using Cartesian and cylindrical configuration?

- Q.4** (a) Describe the various type of interpolation schemes use in robot programming. **03**
- (b) Basic Structure of the Opitz Parts Classification and Coding System. **04**
- (c) Describe the requirements of grippers in robots. Explain any one gripper in details. **07**

OR

- Q.4** (a) Why is master schedule important? How does master schedule accommodate flexibility in manufacturing? **03**
- (b) With a neat sketch explain in details the Proximity and Range sensor and write down application. **04**
- (c) The following table gives the information regarding the parts and the machines on which they are to be processed. **07**

Parts	Machines				
	1	2	3	4	5
1		x	x		x
2	x	x		x	
3	x				x
4		x	x	x	x
5	x	x	x		
6			x	x	x
7	x		x		x
8	x	x	x		x

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

- Q.5** (a) List main part of bicycle. Prepare its product tree structure and its item information including level coding. **03**
- (b) Difference between FMC and FMS. **04**
- (c) What is CIM? What are the benefits of CIM? **07**
- OR**
- Q.5** (a) Explain Production Flow Analysis (PFA). **03**
- (b) “FMSs achieve a higher average utilization than machines in a conventional batch production machine shop”. Evaluate. **04**
- (c) Manufacturing Resource Planning (MRP-II) **07**
