GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2181706   **Date: 15/11/2018**

Subject Name: Robotic Engineering

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)**	1) Define robot. 2) Define base and tool coordinate systems 3) Name the important specifications of an industrial robot.	**03**
	(b)	Explain the various parts of a robot with neat sketch.	**04**
	(c)	Sketch a robot wrist and explain it's the joint movements.	**07**
Q.2	**(a)**	1) What is meant by pitch, yaw and roll? 2) What is work volume? 3) What is meant by a work envelope?	**03**
	(b)	Discuss any one of the types of gripper mechanism.	**04**
	(c)	Briefly explain in the following terms: (i) Payload (ii) compliance (iii) Precision (iv) Accuracy.	**07**
		OR	
	(c)	Describe the types of end effectors & gripper mechanisms with simple sketches.	**07**
Q.3	**(a)**	Explain a robot cell and its use.	**03**
	(b)	What are the uses of sensor in robotics? What are the types of sensors used in robotics?	**04**
	(c)	Discuss the types of drive systems used in robots.	**07**
		OR	
Q.3	**(a)**	1) What is machine interference? 2) What are the four basic robot configurations available commercially? 3) Classify the robot as per the type of control and mobility	**03**
	(b)	Explain how to decide the HP rating of a motor ?	**04**
	(c)	Explain the working of DC servo motors used in robotics	**07**
Q.4	**(a)**	Write a short note on inverse kinematics.	**03**
	(b)	What is meant by Jacobian?	**04**
	(c)	Explain working on external and internal grippers with suitable illustration.	**07**
		OR	
Q.4	**(a)**	Sketch and explain 3 DOF associated with wrist.	**03**
	(b)	Sketch and explain various types of joints in manipulator mechanisms.	**04**
	(c)	Discuss the performance characteristics of actuators. Compare electrical, pneumatic & hydraulic actuators for their characteristics	**07**
Q.5	**(a)**	What are the limitations of on-line robot programming?	**03**
	(b)	Write down the basic types of robot programming.	**04**
	(c)	Discuss the advantages and disadvantages of using robots in industry.	**07**
		OR	
Q.5	**(a)**	State Asimov's Law of Robotics	**03**
	(b)	Differentiate between path planning and trajectory planning	**04**
	(c)	Determine the translated vector for the given vector v=25i+10j+20k, perform a translation by a distance of 8 units in "X" direction, 5 units in "Y" direction and 0 units in "Z" direction.	**07**

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