Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-II Remedial Examination December 2010

Subject code: 720803 **Subject Name: Robotic Engineering**

Date: 21 /12 /2010 **Time: 02.30 pm – 05.00 pm**

Total Marks: 60

Instructions:

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

Q.1 **(a)** What do you mean by robot configuration? Explain 2P, 2PR, and 3R configuration. **06**

(b) Explain (i) Reach and Stroke of robot (ii) Tool orientation. **06**

Q.2 **(a)** Determine the homogeneous transformation matrix to represent a rotation of 30° about OX-axis and a translation of 8 units along the OB-axis of the mobile frame. **03**

(b) Tabulate kinematic joint and link parameters of SCARA robot (Fig.-1) by using D-H representation and derive kinematic equations by using arm matrices. **09**

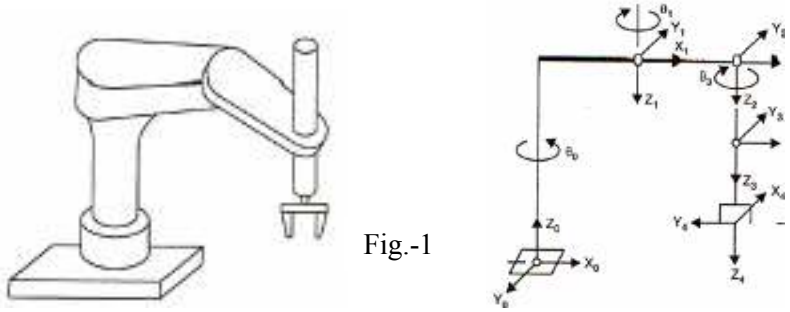

Fig.-1

OR

(b) Define and illustrate the link and joint parameters with figure and uses. **09**

Q.3 **(a)** Compare hard automation and soft automation. **06**

(b) Discuss considerations in gripper selection and design. **06**

OR

Q.3 **(a)** Explain different types of joints in robots. **06**

(b) Enlist the use of sensors in robotics. **06**

Q.4 **(a)** Write a short note on hydraulic motors. **06**

(b) Explain Analog-to-Digital signal conversion for machine vision system. **06**

OR

Q.4 **(a)** Explain Direct and Inverse kinematics with transformation matrix. **06**

(b) Explain 'lead through programming methods'. **06**

Q.5 **(a)** Explain 'robot language structure'. **06**

(b) Write a short note on 'robot centered work cell design'. **06**

OR

Q.5 **(a)** Discuss general considerations in robot material handling. **06**

(b) Explain robot centered compliance (RCC) device for assembly operation. **06**

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