

**GUJARAT TECHNOLOGICAL UNIVERSITY****ME - SEMESTER-IV • EXAMINATION – SUMMER 2015****Subject Code: 742801****Date: 01/05/2015****Subject Name: Robotics and Control****Time: 2:30 pm to 5:00 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) Explain the terms: Repeatability, Precision, Robot manipulator. **07**  
(b) What do you mean by work volume of robot? Sketch the work volume for cylindrical and Cartesian robot anatomies. **07**
- Q.2** (a) Explain the degree of freedom by suitable configuration of robot with sketch. **07**  
(b) What do you mean by actuator use in robots? Describe any two types of actuators. **07**
- OR**
- (b) Classify the absolute control actions and explain any one in brief. **07**
- Q.3** (a) What do you mean by inverse transformations? Explain with suitable example. **07**  
(b) What is Lagrangian? Derive the relation among Lagrangian, kinetic energy and potential energy for robot arm. **07**
- OR**
- Q.3** (a) Explain in detail D-H representation of forward kinematics with algorithm. **07**  
(b) Explain the gravity term and coriolis component as applied to a robot arm. **07**
- Q.4** (a) Write the types of mechanism of mechanical grippers and describe any two in brief. **07**  
(b) Write the short note on proximity sensor and range sensor. **07**
- OR**
- Q.4** (a) Write the comparison of hydraulic drive with pneumatic drive. **07**  
(b) Explain the image storage technique in brief. **07**
- Q.5** (a) What do you mean by Robot vision? Describe about the analog to digital conversion. **07**  
(b) Write the short note on segmentation feature extraction technique. **07**
- OR**
- Q.5** (a) Write the short note on lighting techniques use in robot vision. **07**  
(b) Explain the algorithms use for object recognition. **07**

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