

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII • EXAMINATION – WINTER 2013

Subject Code: 173402**Date: 28/11/2013****Subject Name: Industrial Robotics****Time: 10:30am-01:00pm****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) (i) With the help of a neat sketch shows the basic components of a robot connected as a system. **04**
(ii) Explain briefly the motion of Robot arm **03**
(b) (i) Explain briefly various types of mechanical joints used in robots **03**
(ii) What do you mean by workspace? Explain any one. **04**
- Q.2** (a) (i) What are the components of a hydraulic system? Explain briefly. **04**
(ii) Describe briefly linear variable differential transformer a position sensor. **03**
(b) (i) What is the hydraulic valve? How are these classified? **04**
(ii) What do you mean by servomotor? Explain briefly. **03**
- OR**
- (b) (i) Explain briefly any two types of non-contact proximity sensors. **04**
(ii) What is difference between the status and environment sensors?
- Q.3** (a) Discuss briefly the following operation covered under image processing : **07**
1. Segmentation, 2. Smoothing, 3. Object recognition
(b) What are the illumination techniques in industrial robot? Explain each. **07**
- OR**
- Q.3** (a) (i) What do you understand by the term 'Robot vision'? **03**
(ii) What are the functions of robotic vision system and application? **04**
(b) (i) Explain briefly the following range sensing techniques: **04**
1. Trilateration,
2. Structured lighting approach.
(ii) What are the components of vision system? Show systematic circuit diagram. **03**
- Q.4** (a) (i) Explain the concept of Forward kinematics and inverse kinematics **04**
(ii) What is reverse kinematics of manipulators with two degrees of freedom? **03**
(b) What is the difference between three degrees of freedom and four degrees of freedom? **07**
- OR**
- Q.4** (a) (i) Discuss briefly the requirements of a robot programming language. **04**
(ii) Enlist the considerations which must be handled by robot programming methods. **03**
(b) What is VAL programming? Explain with any one simple industrial example. **07**
- Q.5** (a) What do you mean by RGV and AGV? Why it is necessary to implement robots in industries. **07**
(b) What are the safety considerations for robot operation? **07**
- OR**
- Q.5** (a) What is pay back method in robotic? Explain briefly. **07**
(b) Explain EUAC method and Rate of return method. **07**
