

Time : 3Hrs

Marks: 80

## Instructions

- i) Question No. 1 is compulsory
- ii) Solve any three question from remaining
- iii) Figure to the right indicates marks
- iv) Assume suitable data wherever necessary with justification.

- Q.1 a) Explain different applications of robots? (10)  
b) Explain robot intelligence and task planning? (10)
- Q.2 a) Explain Lagrangian-Euler for robot dynamic? (10)  
b) Why homogeneous co-ordinates are required in robotic manipulator? (10)
- Q.3 a) What is Denavit Hartenberg (D-H). Write full procedure of obtaining the LCD and KP table using DH presentation. (10)  
b) What is the role of sensor in robotics? Explain any one sensor in details? (10)
- Q.4 a) Explain the various types of gripper? (10)  
b) Explain a 4 DOF SCARA robot and its work envelop with diagram? (10)
- Q.5 a) Explain the trajectory planning with example? What are the classical method of trajectory planning. (10)  
b) What are the different types of stepper motors? Explain the working of a variable reluctance type stepper motor with suitable sketches. (10)
- Q.6 a) Explain PID controller to control the joint actuators of robotic manipulator. (10)  
b) Explain in brief robot cell design. (10)