



- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Explain the importance of automation in industry. Draw a neat schematic line sketch of robot wrist showing various motions on it. 7

b) Define robot, and discuss the various types of robot configurations with work volume. 6

OR

2. a) Discuss in brief Joint notation schemes in context of robot. 6

b) Explain in detail work envelope, degree of freedom and robot arm dynamics. 7

3. a) Discuss the various types of robot drive systems with advantage and disadvantage. 7

b) Explain different types of magnetic grippers and electrostatic grippers with neat sketches. 7

OR

4. a) Describe the function of grippers for molten metals with neat sketch. 7

b) Explain classification of end effectors with neat sketch. 7

5. a) Explain forward and reverse transformations of a three degree of freedom arm. 6

b) Explain in detail slew motion, Joint interpolated motion and straight line motion as applicable to robotics. 7

OR

6. a) What is the function of a robot controller? Describe servo and non-servo systems. 6

b) Explain in detail motion control of robots. Describe point to point and continuous path control of robot. 7

7. a) Differentiate between contact type sensor and non-contact type sensor. 7

b) Explain with neat sketch range imaging sensors. 7

OR

8. a) Explain safety measures in robots in context to input output interfaces. 7
b) Explain with neat sketch electro optical imaging sensors. 7
9. a) Explain in detail other considerations in work cell design of robot. 7
b) Explain error detection and recovery in context to automated machining cell. 6

OR

10. a) Describe in brief robot cycle time analysis. 7
b) What are the various types of robot cell layouts. Explain error detection and recovery. 6
11. a) What are the various quantitative techniques for economic performance of robots. 6
b) Explain with neat sketch stamping press operations using robots. 7

OR

12. a) Describe die casting operation using robot with application. 6
b) Describe in brief the various general considerations for robots in material handling operation. 7
