

Elective - I : Industrial Robotics

P. Pages : 2

Time : Three Hours



NJR/KS/18/4607

Max. Marks : 80

- 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.
 9. Use of non programmable calculator is permitted.

1. a) Describe the role of Robot in industry? **6**
- b) What are the various types of Robot configuration? Explain any one with neat sketch. **7**

OR

2. a) Explain briefly the various types of Joints used in Robot. **7**
- b) Draw workspaces for the following configurations. **6**
- 1) Rectangular
 - 2) Cylindrical
 - 3) Spherical
3. a) What is an End-effectors? Explain any one with neat sketch. **7**
- b) Discuss the various types of Robot drive systems for grippers with advantage & disadvantage. **6**

OR

4. a) With help of neat sketch explain the working of a vacuum gripper for flat surface. **6**
- b) Describe the function of grippers for molten, metals with neat sketch. **7**
5. a) A vector $v = 2i + 5j + 3k$ is rotated by 60° about the Z-axis and translated by 3,4 & 5 units in the x, y and z directions respectively. Find the vector with reference, to the reference frame. **7**
- b) Derive forward and reverse transformations of a two degree of freedom arm. **7**

OR

6. a) Explain in detail motion control of robots. Describe point to point and continuous path control of Robot. **7**

- b) What are different programming methods used in Robot. 7
7. a) With help of a neat sketch, explain the construction and working of electro-optical imaging sensors. 7
- b) Explain with neat sketch range imaging sensors. 6

OR

8. a) Explain with neat sketch tactile sensor. 6
- b) Explain safety measures in Robots in context to input output interfaces. 7
9. a) What are the various types of robot cell layouts and give examples of preferred area of applications for each. 7
- b) Explain moving base line tracking system associated with inline robot cell. 7

OR

10. a) Explain error detection and recovery in context to automated machining cell. 7
- b) Explain the various consideration taken into account in robot work cell design. 7
11. a) Explain with neat sketch spot welding operation using robots. 6
- b) What are the various quantitative techniques for economic performance of robots. 7

OR

12. a) Explain loading and unloading operation using robot. 6
- b) Describe die casting operation using robot with application. 7
