



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Mechanical Engineering

Semester End Examination; July - 2023

Industrial Robotics

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Sketch and explain the wrist and its motions. 10
 b. Explain Resolution, Accuracy and Repeatability with sketch. 10

OR

- 2 a. With a neat sketch, explain CAM actuated and screw actuated mechanical grippers. 10
 b. Describe the cartesian coordinate robot with its merits and demerits. 10

UNIT - II

- 3 a. Discuss the advantages, limitations and applications of hydraulic drive system used in industrial robots. 10
 b. Sketch and explain:
 i) Absolute encoders 10
 ii) Incremental encoders

OR

- 4 a. Briefly discuss the working principle of pneumatic drive system used in industrial robots. 10
 b. Discuss range sensing by triangulation technique with a neat sketch. 10

UNIT - III

- 5 a. With neat sketch, explain the steps involved in the implementation of DH convention. 10
 b. Illustrate geometry based direct kinematic analysis by considering an example of two-degree-of-freedom articulated planar robot. 10

OR

- 6 a. Illustrate the application of DH method in three axis articulated arm. 10
 b. Describe the Euler angle representation of system-II and system-III. Also derive the Eulerian rotation matrix of system-I. 10

UNIT - IV

- 7 a. What is lead through programming? Discuss the two types of lead through programming method. 10
 b. Write a VAL program for palletizing task of robot handler. Take a position in 4 rows and 6 columns with a pitch of 50 mm and 400 mm respectively. 10

OR

- 8 a. Discuss first generation and future generation languages of robot programming. 10
- b. Briefly discuss the program control and subroutines in robot programming. 10

UNIT - V

- 9 a. With a simple sketch, explain application of industrial robot in arc-welding. 10
- b. Explain a general consideration in robot material handling. 10

OR

- 10 a. Briefly explain the loading and unloading function in die casting and plastic moulding operations. 10
- b. Discuss the requirements of the robot for spray coating applications. 10

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