



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

(An Autonomous Institution affiliated to VTU, Belagavi)

Second Semester, M.Tech - Mechanical Engineering (MCIM)

Semester End Examination; May/June - 2018

Advanced Industrial Robotics

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

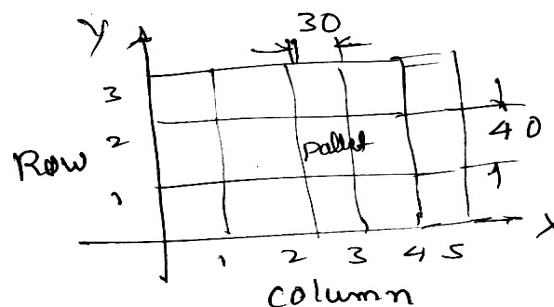
- 1 a. Discuss the advantages and disadvantages of using robots in industry. 10
- b. Define resolution, accuracies, responsibility and work volume with respect robot. 10
- 2 a. Briefly explain the classification of robot system. 10
- b. Discuss briefly about the gripper and give its application. 10

UNIT - II

- 3 a. Determine the homogeneous transformation matrix to represents a rotation of 30° about OX -axis and a translation of 8 unit along OB -axis of the mobile frame. 10
- b. Explain DH convention used in kinematic analysis of robot. 10
- 4 a. What is orientation matrix? Derive it for 2R robot. 10
- b. Align coordinate system for a six axes industrial robot in a fully extended configuration. 10

UNIT - III

- 5 a. Explain the different ways by which robot teaching can be performed. 10
- b. Briefly explained WAIT, SIGNAL and DELAY commands in robot programming. 10
- 6 a. Write a program for palletizing operations as shown in figure using following variables



Pallet variable

ROW - Integer Row

COLUMN - Integer column

X - an X-axis coordinate

Y - Y-coordinate

Location constant

PICK-UP - Point of pick-up object

CORNER - Start of point in the pallet location value

Location Variable

DROP - Point of dropping

10

- b. Briefly explain different command statements used in robot programming. 10

UNIT - IV

- 7 a. Discuss briefly different types of Legged robot locomotion. 10
- b. Briefly explain walking wheel mechanism for wheel configuration. 10
8. Explain the following terms with respect to mobile robot kinematics :
- i) Forward kinematic models
 - ii) Representation of robot position 20
 - iii) Robot kinematic constraints
 - iv) Wheel kinematic constraints

UNIT - V

- 9 a. Sketch and explain path and trajectory consideration for mobile robot. 10
- b. Briefly explain motion control (kinematic control) in mobile robot. 10
10. Discuss the following terms with respect to robot maneuverability :
- i) Degree of mobility
 - ii) Robot maneuverability 20
 - iii) Mobile robot workspace
 - iv) Molonomic robots

* * * *