



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/ Aug. - 2022

Industrial Robotics

Time: 3 hrs

Max. Marks: 100

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

UNIT - I

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| 1 a. Explain three different types of automation by plotting the graph between product variety and product volume. | 10 |
| b. List different classification of Roberts. Explain any two with neat diagram. | 10 |
| 2 a. With neat sketches, explain resolution, accuracy and repeatability with respect to robot. | 10 |
| b. Explain different types of joins used in industrial robots, with a neat diagram for their motions. | 10 |

UNIT - II

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| 3 a. Explain the principle and working of tactile sensors with neat diagram. | 10 |
| b. With a neat block diagram, explain hydraulic drive system of industrial robot mentioning its advantages and limitations. | 10 |
| 4 a. Explain with neat diagram, explain the principle and working of force and torque sensor. | 10 |
| b. With neat diagram, explain the principle and working of range sensor. | 10 |

UNIT - III

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| 5 a. Describe the Euler angle representation of system-II and system-III, also derive the Eulerian rotation matrix for system-I. | 10 |
| b. Explain the steps involved in implementing D-H representation with a neat sketch. | 10 |
| 6 a. Derive an expression for kinetic energy of a robot. | 10 |
| b. Explain the application of D-H method for 3-axis robot arm articulated robot and obtain transformation matrices. | 10 |

UNIT - IV

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| 7 a. Explain manual lead through and power lead through teaching of robot in detail. | 10 |
| b. Explain the features and capabilities of first generation and second generation robot languages. | 10 |
| 8 a. Discuss the program control and subroutines in robot programming. | 10 |
| b. Discuss the end effort and sensor, commands in robots programming languages. | 10 |

Contd... 2

UNIT - V

- 9 a. List and explain the general consideration in Robot material handling in manufacturing industry. 10
- b. With a neat diagram, explain a die casting operation performed by an industrial robot. 10
- 10 a. Explain the application of industrial robot in spray coating in automobile industry. 10
- b. Explain the application of industrial robot in palletizing and related operations. 10

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