



MANIPAL UNIVERSITY JAIPUR

School of Automobile Mechanical and Mechatronics Engineering

Department of Mechatronics Engineering
Course Hand-out

Industrial Robotics | MC 1607 | 4 Credits

Session: Jan- May 2019 | Faculty: Nikhil Shrivastava

Course Outcomes: At the end of the course, students will be able to

- MCI607.1** Outline the basics of robot structure, its classification, and specification and robot drive systems.
- MCI607.2** Study of type of sensors, their construction and working principle and their application as per industrial robotic requirement.
- MCI607.3** Study of robot motion analysis. To predict the position of robotic joint, links, gripper with desired input to enhance employability skills.
- MCI607.4** Study of robot motion analysis. To predict the position of robotic joint, links, gripper with desired input to enhance employability skills.
- MCI607.5** To learn what are the effects of PID and other robot control systems and how they help to control the robot position.
- MCI607.6** To learn how the Passivity-Based Robust and Adaptive Control can help control the position of actuator.

A. SYLLABUS

Introduction: Definition of Robots, Types of Robots, Degrees of Freedom, Degrees of Movements, Robot Configuration, Definition and factor affecting the Control Resolution, Spatial Resolution, Accuracy and Repeatability; Specification of a robot; MTBF; MTTR; Actuators & Sensors in Robot, Moire-Fringes technique; Robot Vision; Rapid Review of Kinematics: Homogeneous Transformations, Forward and Inverse Kinematics, Jacobians. Dynamics: Euler-Lagrange Equations of Motion, Properties of Robot Dynamics, Examples. Independent Joint Control: Actuator Dynamics, PI/PID Control, Drive-Train Dynamics, Feed-forward Control, Multivariable Control: Inverse Dynamics, Passivity-Based Robust and Adaptive Control.

B. TEXT BOOKS

- i. Yu Kozyhev, Industrial Robots Handbook, MIR Publications, 1985.
- ii. K. C. Jain, L. N. Aggarwal, Robotics Principles and Practice, Khanna Publishers, 1997.
- iii. M. P. Groover, Cam and Automation, Prentice Hall Publications, 1995.
- iv. P. A. Janakiraman, Robotics and image processing, Tata McGraw Hill, 1995.
- v. Ganesh S Hegde, Industrial Robotics, University Science Press, 2009.

