

COURSE CODE 1154ME106	INDUSTRIAL ROBOTICS	L	T	P	C
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1. Preamble

This course provides an introduction to the robots types, Laws, configurations and application; Co-ordinate frames and types, Transformations and types; Forward and Inverse Kinematics of manipulator's; all types of robotic sensors; Open loop and closed loop control systems with examples

2. Pre-requisite

Basic Electronics Engineering

3. Links to other Courses

Project Work

4. Course Educational Objectives

To understand an overview of robotics in practice and research with topics including control systems, motion planning, mobile mechanisms, kinematics, inverse kinematics, and sensors.

5. Course Outcomes

On successful completion of this course students will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Demonstrate knowledge of robot configurations and motions.	K3
CO2	Describe the operations of robot components	K3
CO3	Describe the sensing and visioning operations of robot	K3
CO4	Describe methods for programming robot	K3
CO5	Describe industrial applications of robot.	K3

(K3 – APPLY)

6. Correlation of COs with Programme Outcomes

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H				L							L	L	
CO2	H				L							L	L	
CO3	H				L							L	L	
CO4	H				L							L	L	
CO5	H				L							L	L	

H- High; M-Medium; L-Low

7. Course Content

UNIT I: INTRODUCTION

L-9

Definition of a Robot - Basic Concepts - Robot configurations - Types of Robot drives - Basic robot motions - Point to point control - Continuous path control.

UNIT II: COMPONENTS AND OPERATIONS

L-9

Basic control system concepts - control system analysis - robot actuation and feedback, Manipulators – direct and inverse kinematics, Coordinate transformation - Brief Robot dynamics. Types of Robot and effectors - Grippers - Tools as end effectors - Robot/End - effort interface.

UNIT III: SENSING AND MACHINE VISION

L-9

Range sensing - Proximity sensing - Touch sensing - Force and Torque sensing. Introduction to Machine vision - Sensing and digitizing - Image processing and analysis.

UNIT IV: ROBOT PROGRAMMING

L-9

methods - languages - Capabilities and limitation - Artificial intelligence - Knowledge representation – Search techniques - AI and Robotics.

UNIT V: INDUSTRIAL APPLICATIONS

L-9

Application of robots in machining - Welding - Assembly - Material handling - Loading and unloading – CIM - Hostile and remote environments.

TOTAL : 45 PERIODS

8. Text Books

1. John J. Craig, Introduction to Robotics Mechanics and Control, Prentice Hall, 3rd Edition, 2004.
2. M.W. Spong, S. Hutchinson and M. Vidyasagar, "Robot modeling and control," John Wiley and Sons, First Edition, 2005.
3. Norman S. Nise, "Control Systems Engineering", John Wiley and Sons, 6th Edition, 2010.

9. References

1. Richard D. Klafter, Thomas. A, Chri Elewski, Michael Negin, Robotics Engineering an Integrated Approach, Prentice Hall, 1989.
2. Frank L. Lewis, Chaouki T. Abdallah, D. M. Dawson, "Robot manipulator control: theory and practice", CRC press, 2nd Edition, 2003.