

INDUSTRIAL ROBOTICS

Course code	20ME4702E	Year	IV	Semester	I
Course category	Professional Elective- IV	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	-
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes: Upon successful completion of the course, the student will be able to

	Statement	Skill	Level	Units
CO1	Understand the basic anatomy of robots, Kinematics, robot sensors, programming and applications.	Understand, Communication	L2	1,2,3, 4,5
CO2	Apply transformations to solve robot kinematics, dynamics	Apply, Communication	L3	2
CO3	Apply trajectory planning and robot programming skills	Apply, Modern Tool Usage Communication	L3	3
CO4	Apply knowledge of robot sensors and their applications in industries	Apply, Communication	L3	4,5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3									3			3	1
CO2	3	3	2							3			3	1
CO3	3	3	2		2					3			3	1
CO4	3		2							3			3	1

Syllabus

UNIT	Contents	Mapped COs
I	Introduction: Basic concepts - Robot anatomy - classification, robot specifications and Work volume, Types of Robot actuators- Pneumatic, Hydraulic actuators, electric & stepper motors, End Effectors- types of end effectors, grippers and tools, Requirements and challenges of end effectors.	CO1
II	Transformations - homogeneous coordinates for translation & rotation, Kinematics and Dynamics: Manipulators - kinematics: D-H notation, Forward and inverse kinematics: simple problems, Dynamics- lagrangian formulation, introduction to jacobian computation.	CO1, CO2
III	Trajectory planning- trajectory planning with cubic polynomial, blending, higher order trajectories Robot Programming: Robot language classification - programming methods - off and on-line programming - Lead through method - Teach pendent method and programming languages, simple programs.	CO1, CO3
IV	Sensors: Sensor devices, Types of sensors - contact, position and displacement sensors, Force and torque sensors - Proximity and range sensors - acoustic sensors –slip sensors, Robot vision systems	CO1, CO4
V	Industrial Applications: Application of robots - material handling,	CO1,

	processing operations, assembly, inspection, safety considerations. Recent developments in robotics -mobile robot, microbots.	CO4
--	--	------------

Learning Resource

Text books:

- | |
|--|
| <ol style="list-style-type: none"> 1. Mikell P. Groover. Industrial Robotics Technology Programming and Applications, McGraw Hill Co., Singapore, 1995. 2. Robotics and Control / Mittal R K & Nagrath I J / TMH.2017. |
|--|

Reference books

- | |
|--|
| <ol style="list-style-type: none"> 1. Robotic Engineering by Richard D.Klafter, Prentice Hall 2. Introduction to Robotics – Saeed B.Niku, Prentice Hall 3. Introduction to Robotics – John J. Craig, Addison Wesley |
|--|

E-Resources & other digital Material:
--

- | |
|--|
| <ol style="list-style-type: none"> 1. http://nptel.ac.in/downloads/112101098/ |
|--|