

AUTOMATION & ROBOTICS
B.E, V Semester, Mechanical Engineering
[As per Choice Based Credit System (CBCS) scheme]

Course Code	17ME563	CIE Marks	40
Number of Lecture Hours/Week	03	SEE Marks	60
Total Number of Lecture Hours	40 (8Hours per Module)	Exam Hours	03

Credits – 03

Course Objective:

- To identify potential areas for automation and justify need for automation.
- To select suitable major control components required to automate a process or an activity
- To study the various parts of robots and fields of robotics.
- To study the various kinematics and inverse kinematics of robots.
- To study the control of robots for some specific applications.

Module - 1

Introduction to automation

Basic elements of an automated system, advanced automation functions, levels of automation, process industries versus discrete manufacturing industries, continuous versus discrete control, computer process control. Hardware components for automation and process control, sensors, actuators, analog to digital converters, digital to analog converters, input/output devices for discrete data

Module - 2

Automated production lines

Fundamentals of automated production lines, application of automated production lines, analysis of transfer lines, automated assembly systems, fundamentals of automated assembly systems, quantitative analysis of assembly systems, automatic identification methods, barcode technology, radio frequency identification, other AIDC technologies

Module - 3
Industrial Robotics Robotic configuration, robot anatomy and related attributes, robot control systems, end effectors, sensors in robotics, industrial robot applications, robot accuracy and repeatability, different types of robotics, various generations of robots, degrees of freedom – Asimov’s laws of robotics dynamic stabilization of robots.
Module - 4
Spatial descriptions and transformations Positions, orientations, and frames. Mappings: Changing descriptions from frame to frame. Operators: translations, rotations and transformations, transformation arithmetic transform equations, transformation of free vectors computational considerations, manipulator Kinematics, link description, link-connection description, actuator space joint space and Cartesian space
Module - 5
Robot programming Introduction, levels of robot programming, requirements of robot programming language, problems pertaining to robot programming languages, offline programming systems, central issues in OLP systems, automating subtasks in OLP systems, simple programs on robot applications
TEXT BOOKS: 1. Automation, Production systems, and computer integrated manufacturing-MikellP.Groover 3rd edition, Pearson 2009 2. Industrial Robotics-Groover, Weiss, Nagel, McGraw Hill International, 2nd edition, 2012
REFERENCE BOOKS 1. Robotics for Engineers –YoramKoren, McGraw Hill International, 1st edition, 1985. 2. Robotic Engineering - An Integrated approach, Klafter, Chmielewski and Negin, PHI, 1st edition, 2009. 3. An Introduction to Automated Process Planning Systems- Tiess Chiu Chang & Richard A. Wysk