

Branch Name:	Mechanical Engineering
Semester/Year:	Semester VII / Forth Year
Subject Title:	Industrial Automation
Subject Code:	1ET1010707
Pre-requisite:	Elements of Mechanical Engineering, Kinematics of Machine, Dynamics of Machines, Machine Design, CAD.

Course Objectives:

1. To understand the importance of automation in the of field machine tool based manufacturing
2. To get the knowledge of various elements of manufacturing automation - CAD/CAM, sensors, pneumatics, hydraulics and CNC.
3. To understand the role of industrial automation.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	00	03	70	30	-	-	100

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Why automation, Current trends, CAD, CAM, CIM; Rigid automation: Part handling, Machine tools. Flexible automation: Computer control of Machine Tools and Machining Centers, NC and NC part programming, CNC-Adaptive Control, Automated Material handling. Assembly, Flexible fixturing.	08	20
2	CAD-CAM Applications in automation: Geometric modeling for downstream applications and analysis methods; CNC technology, PLC, Micro-controllers, CNC-Adaptive Control.	08	20
3	Low cost automation: Mechanical & Electro mechanical Systems, Pneumatics and Hydraulics, Illustrative Examples and case studies, Safety in Industrial Automation.	08	20
4	Introduction to Modeling and Simulation: Product design, process route modeling, Optimization techniques, Case studies & industrial applications.	05	10
5	Types of Industrial Sensors : Optical, Inductive, Capacitive, Encoders, Ultrasonic, Thermocouples Etc.	05	10
6	Robotics: Identify types of robot, Robot Sensing and Vision Systems, Force and torque sensors, low level vision, high level vision, Robot Programming languages, Introduction to Intelligent Robots, Robots in manufacturing automation. Distinguish uses and applications of robot	08	20

Course Outcomes:**The student will be able to**

1. Understand the importance of automation in the of field machine tool based manufacturing
2. Understand various elements of manufacturing automation - CAD/CAM, sensors, pneumatics, hydraulics and CNC.
3. Understand the role of industrial automation.

List of Reference Books:

1. Mikell P. Groover, Automation, Production Systems, and Computer-integrated Manufacturing, prentice Hall
2. Serope Kalpakjian and Steven R. Schmid, Manufacturing – Engineering and Technology, 7th edition, Pearson
3. Yoram Koren, Computer control of manufacturing system, 1st edition
4. Ibrahim Zeid , CAD/CAM : Theory & Practice, 2nd edition.
5. Craig, John J., Introduction to Robotics: Mechanics & Control, 2nd Edition, Pearson Education, 1989.
6. Fu, K.S., R.C. Gonzalez, C.S.G. Lee, Robotics: Control, Sensing, Vision & Intelligence, McGrawHill, 1987.

E-Resources:

1. <https://nptel.ac.in/courses/108105062/>
2. <https://www.youtube.com/watch?v=JJ0NkZ8pa4Q>
3. <http://vlab.co.in/>