COURSE CONTENT

Automation in Manufacturing

I Semester: M.Tech (CAD/CAM)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
2214014	Advanced	3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisites: Production Technology, Machine Tools, Operations Research

Course Overview:

This course introduces automation in manufacturing systems, covering automation strategies, production concepts, costs, and levels of automation. It explores material handling systems, including transport, storage, and automated solutions, along with data capture technologies like barcoding. Students learn the design and analysis of manual and automated assembly lines, including line balancing methods. The course also covers transfer lines and automated assembly systems, focusing on their design, operation, and performance, preparing students for efficient and modern manufacturing practices.

Course Objectives:

1. Understanding Automation.
2. To know Material handling.
3. Expose manual assembly lines.
4. Impart knowledge on transfer lines.
5. To study automated assembly systems.

Course Outcomes: After Completion of the Course, Students should be able to

1. Illustrate the basic concepts of automation in manufacturing.
2. Describe the importance of automated material handling and storage systems.
3. Explain manual assembly lines.
4. Analyze various transfer lines.
5. Interpret the importance of automated assembly systems.

UNIT- I:

Introduction to Automation: Automation in Production Systems-Automated Manufacturing Systems, Computerized Manufacturing Support Systems, Reasons for Automation, Automation Principles and Strategies. Manufacturing operations, Production Concepts and Mathematical Models. Costs of Manufacturing Operations, Basic Elements of an Automated Systems, Advanced Automation Functions, Levels of automation.

UNIT- II:

Introduction to Material Handling: Overview of Material Handling Equipment, Considerations in Material Handling System Design, the 10 Principles of Material Handling. Material Transport Systems, Automated Guided Vehicle Systems, Monorails and other Rail Guided Vehicles, Conveyor Systems, Analysis of Material Transport Systems. Storage Systems, Storage System Performance, Storage Location Strategies, Conventional Storage Methods and Equipment, Automated Storage Systems, Engineering Analysis of Storage Systems.

Automatic data capture-overview of Automatic identification methods, bar code technology, other ADC technologies.

UNIT - III:

Manual Assembly Lines - Fundamentals of Manual Assembly Lines, Alternative Assembly Systems, Design for Assembly, Analysis of Single Model Assembly Lines, Line balancing problem, largest candidate rule, Kilbridge and Wester method, and Ranked Positional Weights Method, Mixed Model Assembly Lines, Considerations in assembly line design.

UNIT-IV:

Transfer lines, Fundamentals of Automated Production Lines, Storage Buffers, and Applications of Automated Production Lines. Analysis of Transfer Lines with no Internal Storage, Analysis of Transfer lines with Storage Buffers.

UNIT-V:

Automated Assembly Systems, Fundamentals of Automated Assembly Systems, Design for Automated Assembly, and Quantitative Analysis of Assembly Systems - Parts Delivery System at Work Stations, Multi- Station Assembly Machines, Single Station Assembly Machines, Partial Automation.

TEXT BOOKS:

1. Automation, Production systems and computer integrated manufacturing by Mikel P. Groover, Pearson Education.

REFERENCE BOOKS:

1. CAD CAM: Principles, Practice and Manufacturing Management by Chris Mc Mohan, Jimmie Browne, Pearson Edu. (LPE)
2. Automation by Buckinghsm W, Haper & Row Publishers, New York, 1961
3. Automation for Productivity by Luke H.D, John Wiley & Sons, New York, 1972.

ELECTRONIC RESOURCES:

1. https://nptel.ac.in/courses/112103293

MATERIALS ONLINE:

1. Course template
2. Definitions and terminology
3. Lecture notes
4. E-Learning Readiness Videos (ELRV)