19ME302 AUTOMATION IN MANUFACTURING

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
45	-	30	10	30	-	5	-	-

PRE-REQUISITE COURSE: Machining Technology

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with the principles, concepts and techniques of automated material handling systems, inspection systems and flexible manufacturing systems.The objective of this course is to develop the real time interface of computers in manufacturing automation.
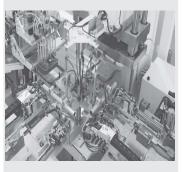
COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Enumerate the principle, strategies and advantages of automation.	1
2	Design elements in FMS using simulation and analytical techniques.	2,5
3	Understand the different automated material handling, storage, retrieval and inspection systems.	1,5
4	Develop CNC programs to manufacturing industrial components.	3,5

SKILLS:

- ✓ *Design of industry specific automation layout.*
- ✓ *Develop part programming for automated process in modern manufacturing with CNC.*
- ✓ *Apply technology for capturing and storing the manufacturing information.*
- ✓ *Identify modern engineering tools necessary for Manufacturing.*

UNIT- I   **L-9**

INTRODUCTION: Definition of automation, Reasons for automation, Types, Principles and strategies of automation, Current trends and Industrial application of automation, Information technology concepts - IOT.

UNIT- II   **L-9**

GROUP TECHNOLOGY: Part families, Parts classification and coding, Opitz and MICLASS, Production flow analysis (PFA), Group technology machine cell design, Types and benefits of GT.

COMPUTER AIDED PROCESSING PLANNING(CAPP): Retrieval and Generative type systems, Current product manufacturing concepts like Lean and Agile Manufacturing.

UNIT- III   **L-9**

FLEXIBLE MANUFACTURING SYSTEMS (FMS): Introduction to FMS, Components of FMS, Types of flexibilities, Applications and benefits, Layout Configurations, Implementation, Quantitative analysis of FMS, Simple problems.

AUTOMATED MATERIAL HANDLING SYSTEMS: Automated material handling systems, Conveyor system, Automated guided vehicles, Pallets, Automated storage and retrieval systems, Carousel storage system and automated data capturing systems.

UNIT- IV   **L-9**

COMPUTER AIDED MANUFACTURING: Introduction to Numerical Control Machines (NC), Computer Numerical Control Machines (CNC) and Direct Numerical Control (DNC) Machines - Components: Coordinate Systems, Motion Control and Part Programming.

UNIT- V   **L-9**

AUTOMATED ASSEMBLY LINES: Fundamentals, System configuration, Part delivery at workstation nd its applications, Design for automated assembly, Quantitative analysis of assembly systems, Line balancing algorithm, Largest candidate rule - simple problems; Kilbridge and Wester method - simple problems; Ranked positional weights method, Computerized techniques - simple problems.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS   **TOTAL HOURS : 30**

1. To prepare manual part program for facing, step turning, taper and finish turning using ordinary cycle.
2. To prepare manual part program for facing, step turning, taper and finish turning using canned cycle.
3. To prepare manual part program for grooving, threading and axial drilling using canned cycle.
4. To prepare manual part program for linear and circular interpolation using milling operation.
5. To perform machining of components on CNC Turning and Milling Center.
6. To generate the NC code for turning operation using cam software.
7. To generate the NC code for milling operation using cam software.
8. To generate a profile for turning and milling operations and verify the tool path using cam software.
9. To develop GT code for engine components.
10. To model FMS layout for car assembly line.

TEXT BOOKS :

1. M.P. Groover, "Automation, Production Systems and Computer Integrated Manufacturing", 3rd edition, PE/PHI, 2013.
2. Yoram Koren, "Computer Control of Manufacturing Systems", 2nd edition, Tata McGraw-Hill, 2008.

REFERENCE BOOKS :

1. Radhakrishnan, Subramanyan. S and Raju V, "CAD/CAM/CIM", 1st edition, New Age International Publishers, 2008.
2. W. Buekinsham, "Automation", 3rd edition, PHI Publications, 2004.
3. Bonetto R., "FMS in Practice", 1st edition, North Oxford Academic Publisher, 2012.