

## ME435 AUTOMATION IN MANUFACTURING

### **Course Description & Objective:**

*To expose the students in the area of automation followed by industries for material handling, storage, automated flow lines, and line balancing systems. To familiarize the methodologies followed for line balancing and variety of automated guided vehicles and other systems. To give the awareness on standard circuit systems followed by industries in the case of pneumatic and hydraulic systems.*

### **Course Outcomes:**

- 1. Students will understand the automation technology, and its importance in manufacturing process.*
- 2. Students gain the knowledge in hydraulic and pneumatic circuits followed in industries.*
- 3. Students gain the knowledge on transport system used in industries and its working principle.*
- 4. Students will understand, the importance of buffer storage and familiarize its design concept.*
- 5. Students will understand the line balancing concept followed in industries and its need.*

### **UNIT – I Introduction:**

Types and strategies of automation, pneumatic and hydraulic components and circuits. Automation in machine tools, Mechanical feeding systems and machine tool control systems.

### **UNIT – II Automated Flow Lines:**

Methods of work part transport, Mechanical buffer storage control function, design and fabrication considerations.

**Analysis of Automated flow lines:** General terminology and analysis of transfer lines without and with buffer storage, partial automation and implementation aspects.

### **UNIT – III Assembly Line Balancing:**

Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

**UNIT – IV Automated Material Handling:**

Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems. Automated storage and retrieval systems; work in process storage, interfacing of handling and storage with manufacturing.

**UNIT – V Adaptive Control Systems:**

Introduction, adaptive control with optimization, Adaptive control with constraints, Application of A.C. in Machining operations. Use of various parameters such as cutting force, Temperatures, vibration and acoustic emission.

**TEXT BOOKS :**

1. M.P. Groover, "Automation, Production Systems and Computer Integrated Manufacturing", 3<sup>rd</sup> ed., PHI Publications, 2008.
2. Radhakrishnan, "CAD / CAM/ CIM" 3<sup>rd</sup> ed., Newage Publications, 2009.

**REFERENCE BOOKS :**

1. Yoram Koren, "Computer control of Manufacturing Systems", 2<sup>nd</sup> ed., McGraw Hill Publications, 2005.
2. W. Buekinsham, "Automation", 3<sup>rd</sup> ed., PHI Publications, 2011.