# Automation

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| **Semester II**  **Subject code - 6PC5205ME** | **L**  **3** | **T**  **1** | **P**  **0** | **Credits**  **4** |

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| **Course Objectives**: | **Course Outcomes**: |
| 1. Understand the Terminologies used in the Field of Automation. 2. Gain Knowledge about Different Automation Technologies currently in use. 3. Appreciate the Importance of Automation in Improvement of Quality. 4. Identify Impact of Automation on Society & Environment. 5. Appreciate the Significance of Artificial Intelligence for the Future of Automation. | **After completion of the course, the student will be able to**   1. Assess the Need & Feasibility of Automation for the Current Industries. 2. Identify the Technologies to be used for different Types of Industries. 3. Do a detailed analysis of the Effect of Automation on Price & Quality. 4. Explain the ill Effects of Automation on Society & Environment. 5. Do Further Research on Future Technologies like Artificial Intelligence & its Applications in Industries. |

## UNIT – I

**Introduction:** Definition of Automation, Types of Production, Functions of Manufacturing, Organization and Information Processing in Manufacturing, Production Concepts and Mathematical Models, Automation Strategies

**Production Economics**: Methods of Evaluating Investment Alternatives, Costs in Manufacturing, Break-Even Analysis, Unit Cost of Production, Cost of Manufacturing Lead time and Work-in-process.

## UNIT – II

**Automation Production Lines:** Automated Flowlines, Methods of Workpart Transport, Transfer Mechanism, Buffer Storage, Control Functions, Automation for Machining Operations, Design and Fabrication Considerations. *Analysis of Automated Flow Lines*: General Terminology and Analysis, Analysis of Transfer Lines Without Storage, Partial Automation, Automated Flow Lines with Storage Buffers, Computer Simulation of Automated Flow Lines.

## UNIT – III

**Control Technologies in Automation:**

Industrial Control Systems, Process Industries Versus Discrete-Manufacturing Industries, Continuous Versus Discrete Control, Computer Process and its Forms. (SLE: Sensors, Actuators and other Control System Components).

**Industrial Applications**: Objectives, Automation in Manufacturing, Robot Application in Industry, Task Programming, Robot Intelligence and Task Planning, Modern Robots, Future Application and Challenges and Case Studies. (SLE: Goals of AI Research, AI Techniques)

## UNIT –IV

**Automated Materials Handling*:***

The Material Handling Function, Types of Material Handling Equipment, Analysis for Material Handling Systems, Design of the System, Conveyor Systems, Automated Guided Vehicle Systems. Automated Storage Systems: Storage System Performance, Automated Storage/Retrieval Systems, Carousel Storage Systems, Work-in-process Storage, Interfacing Handling and Storage with Manufacturing.

## UNIT – V

**Automated Inspection and Testing:**

Inspection and testing, Statistical Quality Control, Automated Inspection Principles and Methods, Sensor Technologies for Automated Inspection, Coordinate Measuring Machines, Other Contact Inspection Methods, Machine Vision, Other optical Inspection Methods. Modeling Automated Manufacturing Systems: Role of Performance Modeling, Performance Measures, Performance Modeling Tools: Simulation Models, Analytical Models. The Future Automated Factory: Trends in Manufacturing, The Future Automated Factory, Human Workers in the Future Automated Factory, The social impact.

## References:

* 1. Mikell P.Groover, Automation, Production Systems and Computer Integrated Manufacturing, Pearson Education Asia.
  2. C.Ray Asfahl, Robots and manufacturing Automation, John Wiley and Sons New York.
  3. N.Viswanadham and Y.Narahari, Performance Modeling of Automated Manufacturing Systems, Prentice Hall India Pvt. Ltd.
  4. Stephen J. Derby, Design of Automatic Machinery, Special Indian Edition, Marcel Decker, New York, YesdeePublishing Pvt. Ltd, Chennai
  5. Robotics, control vision and intelligence-Fu, Lee and Gonzalez. McGraw Hill International, 2nd edition.