**GOVT. POLYTECHNIC BOLANGIR**

**Department of Mechanical Engineering**

| **LESSON PLAN: 2025-26** |
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| **Name of the Faculty: Paresh Kumar Mishra (Lecturer Stage-I)** |
| **Subject: COMPUTER-INTEGRATED MANUFACTURING (CIM) (TH3)(MEPC206)**<br>Program: Diploma in Mechanical Engineering<br>Semester: 4th<br>Total Contact Hours: 45<br>Total Marks: 100<br>Assessment: Progressive –30, End Term – 70<br>Credits: 3 |

**COURSE OBJECTIVES:**

After completion of the course, the students will be able to

1. Describe basic components and networks involved in CIM.
2. Illustrate hardware, software and product modeling at industry level
3. Apply process planning and program coding of task.
4. Design a manufacturing cell and cellular manufacturing system.
5. Design automated material handling and storage systems for a typical production system.

| **UNIT-I: Concept of Computer Integrated Manufacturing (CIM) (Total Classes: 10)** | | | | |
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| **Class No.** | **Topic** | **Subtopics** | **Teaching Aids / Activities** | **Course Objective** |
| 1 | Introduction to CIM | • Definition of Computer Integrated Manufacturing • Evolution of manufacturing systems • Need for CIM | • Chalk & board explanation • Industry examples (automobile manufacturing) | CO1 |
| 2 | Concept of CIM | • Scope and objectives of CIM • CIM as an integrated system | • Block diagram explanation • Student interaction | CO1 |
| 3 | Basic Components of CIM | • Hardware components • Software components • Human and organizational elements | • Block diagram drawing • Real-time examples | CO1, CO2 |
| 4 | CIM Architecture | • Levels of CIM (factory, shop floor, cell) • Information flow in CIM | • Hierarchical diagram explanation • Case discussion | CO1, CO2 |
| 5 | Distributed Database System | • Concept of distributed database • Advantages in manufacturing • Data sharing and control | • Chalk & board explanation • Simple industrial examples | CO1, CO2 |
| 6 | Distributed Communication System | • Concept of distributed communication • Role in CIM • Data exchange between systems | • Network diagram explanation • Classroom discussion | CO1 |

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| 7 | Computer Networks for Manufacturing | • Types of networks (LAN, MAN, WAN) • Manufacturing networks (MAP, fieldbus – concept) | • Network topology sketches • Examples from industry | CO1 |
| 8 | Future Automated Factory | • Concept of future factory • Flexible and intelligent manufacturing • Role of AI and automation | • Video/animation (if available) • Brainstorming session | CO2 |
| 9 | Social Factors in CIM | • Impact of CIM on employment • Skill development • Human–machine interaction | • Group discussion • Case-based learning | CO1, CO5 |
| 10 | Economic Factors & Revision | • Economic benefits of CIM • Cost, productivity and quality • Unit revision & recap | • Summary table • Oral quiz / doubt clearing | CO1, CO5 |
| **UNIT-II: Computer Aided Design (CAD) (Total Classes: 10)** | | | | |
| **Class No.** | **Topic** | **Subtopics** | **Teaching Aids / Activities** | **Course Objective** |
| 11 | Introduction to CAD | • Definition of CAD • Role of CAD in CIM • Advantages of CAD | • Chalk & board explanation • Industrial design examples | CO2 |
| 12 | CAD Hardware | • Input devices (keyboard, mouse, scanner, digitizer) • Output devices (monitor, plotter, printer) | • Hardware images • Classroom demonstration | CO2 |
| 13 | CAD Software | • Types of CAD software • System software and application software • CAD data formats | • Software interface screenshots • Discussion on industrial software | CO2 |
| 14 | Product Modelling | • Concept of product modelling • Wireframe, surface and solid modelling | • 3D model visuals • Comparison table | CO2 |
| 15 | Automatic Drafting | • Concept of automatic drafting • Benefits over manual drafting | • CAD drawing demonstration (video) • Drawing samples | CO2 |
| 16 | Engineering Analysis using CAD | • Role of CAD in engineering analysis • Design verification and optimization | • Case-study discussion • Problem-based learning | CO2 |
| 17 | FEM – Introduction | • Need of Finite Element Method • Basic concept of FEM | • Element and mesh sketches • Concept explanation | CO2 |
| 18 | FEM Design Review & Evaluation | • FEM-based design review • Stress, strain and deformation evaluation | • FEM result images • Interpretation discussion | CO2 |
| 19 | Group Technology (GT) | • Concept of Group Technology • Coding and classification (concept only) | • Part family examples • GT layout diagrams | CO4 |
| 20 | Group Technology Centre & Revision | • Group Technology Centre • Advantages of GT in manufacturing • Unit revision | • Layout sketches • Recap quiz | CO4 |
| **UNIT-III: Computer Aided Manufacturing (CAM) (Total Classes: 8)** | | | | |

| Class No. | Topic | Subtopics | Teaching Aids / Activities | Course Objective |
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| 21 | Introduction to CAM | • Definition of Computer Aided Manufacturing • Role of CAM in CIM • Advantages of CAM | • Chalk & board explanation • Industrial examples (CNC shop) | CO2 |
| 22 | CAM System Components | • Hardware components of CAM • Software components of CAM • Integration with CAD | • Block diagram explanation • CAD–CAM workflow discussion | CO2 |
| 23 | Computer Assisted NC Programming | • Concept of computer assisted part programming • Steps in NC part programming | • Flowchart on board • Program structure explanation | CO3 |
| 24 | NC Programming for Turning | • Plain Turning – tool path generation • Step Turning – tool path generation | • Sample NC programs • Tool path sketches | CO3 |
| 25 | Computer Assisted Robot Programming | • Concept of robot programming • Online and offline programming • Applications in manufacturing | • Robot cell images/videos • Application discussion | CO3 |
| 26 | Computer Aided Process Planning (CAPP) | • Concept and need of CAPP • Variant and Generative CAPP | • Process planning charts • Case-based explanation | CO3 |
| 27 | Computer Aided MRP | • Concept of Material Requirements Planning • Role of computers in MRP • Benefits in manufacturing | • Simple MRP flow diagram • Industrial example | CO5 |
| 28 | CAM Applications & Revision | • Integration of CAM with CIM • CAM applications in industry • Unit revision & recap | • Summary table • Oral quiz / doubt clearing | CO2, CO3 |
| **UNIT-IV: Computer aided production scheduling (Total Classes: 10)** | | | | |
| **Class No.** | **Topic** | **Subtopics** | **Teaching Aids / Activities** | **Course Objective** |
| 29 | Introduction to Computer Aided Production Systems | • Role of computers in production management • Integration with CIM | • Chalk & board explanation • Industrial examples | CO1 |
| 30 | Computer Aided Production Scheduling | • Concept of production scheduling • Objectives and benefits • Types of schedules | • Scheduling charts • Classroom discussion | CO3 |
| 31 | Advanced Production Scheduling | • Computer-based scheduling techniques • Priority rules (concept only) | • Flowchart explanation • Case-based learning | CO3 |
| 32 | Computer Aided Inspection Planning | • Concept of inspection planning • Inspection stages in manufacturing | • Inspection flow diagram • Examples from quality control | CO3 |
| 33 | Computer Aided Quality & Inspection | • Use of computers in inspection • Data acquisition and reporting | • Images of CMM / inspection systems • Discussion | CO2 |
| 34 | Computer Aided Inventory Planning | • Inventory planning concepts • Role of computers in inventory control | • Inventory flow chart • Simple industrial example | CO5 |

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| 35 | Inventory Planning Techniques | • EOQ, reorder level (concept only) • Benefits of computerized inventory | • Numerical illustration (simple) • Classroom interaction | CO5 |
| 36 | Flexible Manufacturing System (FMS) | • Definition of FMS • Components of FMS | • Block diagram explanation • Video/animation (if available) | CO4 |
| 37 | Flexible Manufacturing Concept | • Flexibility types • Advantages and limitations of FMS | • Comparison table • Industry examples | CO4 |
| 38 | Applications & Revision | • Applications of FMS • Role of FMS in CIM • Unit revision & recap | • Summary chart • Oral quiz / doubt clearing | CO4, CO5 |
| **UNIT-V: Integrating NC machines (Total Classes: 7)** | | | | |
| **Class No.** | **Topic** | **Subtopics** | **Teaching Aids / Activities** | **Course Objective** |
| 39 | Integration in CIM | • Need for system integration in CIM • Overview of integrated manufacturing environment | • Chalk & board explanation • CIM block diagram | CO1 |
| 40 | Integration of NC Machines & Robots | • Integrating NC machines with robots • Role of controllers and communication | • System layout diagrams • Industrial examples | CO3 |
| 41 | AGVs & NC Equipment Integration | • Automated Guided Vehicles (AGVs) • Integration with NC machines and robots | • AGV flow layout • Video/animation (if available) | CO5 |
| 42 | Computer Aided Quality Control | • Concept of CAQC • Role of computers in quality control | • Quality control flow chart • Industrial case discussion | CO2 |
| 43 | Business Functions in CIM | • Business functions supported by CIM • Integration of manufacturing and business | • Information flow diagram • Discussion | CO1 |
| 44 | Computer Aided Forecasting | • Concept of forecasting • Role of computers in demand forecasting | • Simple forecasting charts • Practical examples | CO5 |
| 45 | Office Automation & Revision | • Concept of office automation • Role in CIM environment • Unit revision & recap | • Summary table • Oral quiz / doubt clearing | CO1, CO5 |

20/12/25

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