



**NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR**  
**DEPARTMENT OF PRODUCTION & INDUSTRIAL**  
**ENGINEERING**

**COURSE HANDOUT**

**Autumn Semester Session 2019-20**

**Date: 23/07/2019**

**Batch: M.Tech 1<sup>st</sup> Semester (Manufacturing Systems Engineering)**

**Course code: PI4107**

**Credits: 4**

**L T P: 3 1 0**

**Course Title: Manufacturing Strategies**

**Instructor in-Charge: Dr. Dinesh Kumar**

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**COURSE DESCRIPTION**

- Introduction, Historical perspective of manufacturing management, Competitive priorities and operational Strategies, Functional area strategy and Capability, Case Study.
- Demand Forecasting: Introduction, Quantitative Methods introduction, Time series and moving averages method, Exponential Smoothing method, Regression Analysis Method, Qualitative Methods.
- Facility Design: Introduction and History, Product design and process selection, Capacity planning, Plant location and Plant layout.
- Inventory control: From EOQ to ROP, Independent Demand Inventory control and Economic Order Quantity (EOQ), Dynamic lot sizing, Statistical inventory control models.
- The MRP crusade: History, Need, Evolution, Dependent Demand and Material Requirement Planning (MRP), Structure of MRP system, MRP Calculations.
- The JIT revolution: Just-in-Time System: origin and goals, Characteristics of JIT Systems, Continuous Improvement, Kanban System, Strategic Implications of JIT System.
- Production Planning and Control: Shop floor Production scheduling,
- Aggregate planning, Aggregate and workforce planning
- Additional Topics to be covered: Lean, Agile and green Manufacturing Approaches.

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**COURSE OUTCOMES**

**CO1:** Students will recognize the role of manufacturing strategies in a competitive scenario.

**CO2:** Students will identify various demand forecasting methods and solve real world demand forecasting problems.

**CO3:** Students will recognize the inventory control models and apply such models to solve complex inventory management problems.

**CO4:** Students will review the advanced production management methods including MRP aggregate planning and JIT production.

**TEXT BOOKS**

**T1:** Hiller, F. S. and Lieberman, G. J (2001), Introduction to operations Research, Tata McGraw-Hill, New Delhi, Seventh Edition.

**T2:** Chopra, S. and Meindl, P. (2004), Supply Chain Management: Strategy, Planning and Operation, PHI, New Delhi, Second Edition.

**T3:** Jeffrey Liker (2017), The Toyota Way, McGraw Hill Education; 1<sup>st</sup> Edition

**REFERENCE BOOKS**

**R1:** Martinich, J.S. (2010), Production and Operation Management: An Applied Modern Approach, Wiley India, Delhi.

**R2:** Y. Monden, (2011), Toyota production system: An integrated approach to Just-in-time, Taylor & Francis, New York, 4th Edition

## INTERNET RESOURCES

### *I<sub>1</sub>: Lean Manufacturing*

<https://www.sciencedirect.com/search/advanced?q=lean%20manufacturing&origin=home&zone=qSearch&articleTypes=CH%2CREV&lastSelectedFacet=articleTypes>

### *I<sub>2</sub>: Agile Manufacturing*

<https://www.sciencedirect.com/search/advanced?q=Agile%20manufacturing&articleTypes=REV%2CCH&show=25&sortBy=relevance>

### *I<sub>3</sub>: Green Manufacturing*

<https://www.sciencedirect.com/search/advanced?q=green%20manufacturing&articleTypes=REV%2CCH&show=25&sortBy=relevance>

## COURSE PLAN

| Lect. No. | Topics to be covered  | Ref.   |
|-----------|---|--|
| 1-3       | Introduction, Historical perspective of manufacturing management, Competitive priorities and operational Strategies, Functional area strategy and Capability, Case Study. | <b>R1 (CH-1&amp;2) and Research Articles</b>       |
| 4-6       | Demand Forecasting: Introduction, Quantitative Methods introduction, Time series and moving averages method,  | <b>T1 (CH-20), T2 (CH-7), R1 (CH-4)</b>            |
| 7-9       | Exponential Smoothing method, Regression Analysis Method  |  |
| 10-11     | Qualitative Methods   |  |
| 12-14     | Facility Design: Introduction and History, Product design and process selection, Capacity planning, Plant location and Plant layout                                       | <b>R1 (CH-6)</b>                                   |
| 15-18     | Inventory control: From EOQ to ROP, Independent Demand Inventory control and Economic Order Quantity (EOQ)  | <b>T1 (CH-19), R1 (CH-13)</b>                      |
| 19-21     | Dynamic lot sizing, Statistical inventory control models.   |  |
| 22-25     | The MRP crusade: History, Need, Evolution, Dependent Demand and Material Requirement Planning (MRP), Structure of MRP system, MRP Calculations.                           | <b>R1 (CH-14)</b>                                  |
| 26-28     | The JIT revolution: Just-in-Time System: origin and goals, Characteristics of JIT Systems,  | <b>T3, R2</b>                                      |
| 29-31     | Continuous Improvement, Kanban System, Strategic Implications of JIT System   |  |
| 32-34     | Production Planning and Control: Shop floor Production scheduling   | <b>T1 (CH-5,6&amp;12)</b>                          |
| 35-37     | Aggregate planning, Aggregate and workforce planning  | <b>T2 (CH-8), R1 (CH-12)</b>                       |
| 38        | Additional Topics to be covered: Lean, Agile and green Manufacturing Approaches   | <b>I<sub>1</sub>, I<sub>2</sub>, I<sub>3</sub></b> |

## EVALUATION SCHEME (EC)

| EC No. | Evaluation Component | Duration | Weightage | Date & Time                | Nature of Component |
|--------|----------------------|----------|-----------|----------------------------|---------------------|
| 1.     | Mid Semester         | 2 Hrs    | 30%       | Refer to Academic calendar | Closed Book         |
| 2.     | End Semester         | 3 Hrs.   | 50%       |                            | Closed Book         |
| 3.     | Internal Assessment  | --       | 20%       |                            |                     |

**Consultation Hours:** 4PM to 6PM (Monday to Friday) In CAD/CAM Lab of Manufacturing Dept.

**Note:** All notices regarding the course will be displayed only on the Department of Manufacturing Engineering notice board.

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