

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Mechanical (Industrial Engineering)

Semester: II

Subject: Operations Planning and Control Techniques (Major Elective III)

Code: 1724605

Sr. No.	Topic	Hours
1	Introduction: Basic Concept of Manufacturing Planning and Control System(MPC), Challenges of MPC System, Manufacturing Management Decisions, MPC Framework, Integrated Manufacturing and Management Systems	03
2	Demand Management and Forecasting: Components of Demand, Types of Demands, Types of Forecasting Methods, Factors affecting forecasting, Use of forecasting in different functional areas of management, Demand patterns and selection of forecasting techniques, Measures of forecast accuracy [Mean Absolute Deviation (MAD), Mean Square Error (MSE), Mean Forecast Error (MFE), Mean Absolute Percent Error (MAPE)], Forecasting Methods (Quantitative and Qualitative), Simple Moving Average, Weighted Moving Average, Single Exponential Smoothing, Double Moving Average, Double Exponential Smoothing, Simple Regression, Semi-average Method, Multiple Regression, Delphi Method, Market Survey, Historical Analogy and Life Cycle analysis, Scenario Based Forecasting.	10
3	Production and Materials Planning: Functions, Objectives and Phases of Production Planning & Control (PPC), Aggregate Planning Strategies and Methods, Master Production Schedule (MPS), Materials Requirement Planning (MRP) Concept, Product Structure and Bill of Material, Lot sizing in MRP Systems – Minimum Cost per Period Method, Period Order Quantity Method, Least Unit Cost Method, Part Period Balancing Method, Evolution from MRP to Manufacturing Resource Planning (MRP II) – Closed Loop Concept.	10
4	Inventory and Shop –Floor Control: Independent and Dependant Demands, Purchase Model with Instantaneous Replenishment (<i>Without and Without Shortages</i>), Manufacturing Model (<i>With and Without shortages</i>), Quantity Discounts, Fixed Order Quantity System, Periodic Review System, ABC, XYZ, VED, FSN and SDE Analysis, Shop-Floor Control (<i>Tools of Shop-Floor Control, Gantt charts</i>), Improving Shop Performance.	10
5	Synchronous Manufacturing and Theory of Constraints: Concept of Synchronous Manufacturing, Hockey-Stick Phenomenon, Business Performance Measurements, Unbalanced Capacity, Bottlenecks and Capacity –Constrained Resources, Methods for Control, Drum-Buffer-Rope Analogy for Control, Comparing Synchronous Manufacturing with MRP and JIT, “VAT”	06

	Classification of Industries.	
	Total	39

Term Work:

The term work shall be based on the topics mentioned above.

Practical / Oral:

The candidate shall be examined on the basis of term-work.

Text Books:

- 1 Production and Operations Management – Manufacturing and Services, Richard B. Chase, Nicholas J. Aquilano, F. Robert Jacobs, Tata McGraw-Hill Publishing Company Limited.
- 2 Production and Operations Management by R. Panneerselvam, Prentice – Hall of India Private Limited, New Delhi.

Reference Books:

- 1 Manufacturing Planning and Control Systems, Thomas E. Vollman, William L. Berry, D. Clay Whybark, Galgotia Publications (P) Ltd. (The Irwin Series in Quantitative analysis for Business)
- 2 Operations Management – Strategy and Analysis, Lee J. Krajewski and Larry P. Ritzman, Pearson Education Asia (Addison-Wesley).
- 3 Modern Production/Operations Management, Elwood S. Buffa and Rakesh K. Sarin, Wiley Student Edition.
- 4 Production System, Planning, Analysis and Control, J L Riggs,
- 5 Production Planning and Inventory Control, Seetharama L. Narasimhan, Dennis W. McLeavy and Peter J. Billington, Prentice-Hall of India Pvt. Ltd., New Delhi.
- 6 Analysis and Control of Production Systems, Elsayed A. Elsayed and Thomas O. Bouche, Prentice Hall Publication.
- 7 **Operations Management, Monks J.G John**, John Wiley
- 8 Production and Inventory Management, Y A. C. Hax and D. Candea Prentice-Hall, Englewood Cliffs, NJ.

Production and Inventory Decisions

- 1.
- 2.
- 3.
- 4.
- 5.

ID133 Production and Inventory Decisions 3 0 0 3

INTRODUCTION

An Overview of production systems, Production management objectives, Manufacturing strategy, Technological innovations on Manufacturing, Corporate strategic choices, Management of Technology.

FORECASTING

The forecasting process, Time series forecasting models, Monitoring and controlling the forecasting system, multi-item forecasting, Casual models, Judgement methods.

PLANNING ACTIVITIES

Aggregate Planning Strategies and methods, the Master Production Schedule, Planning of material requirements - MRP, Manufacturing Resources Planning.

CONTROL ACTIVITIES

Capacity planning and control, Production Activity control, Just - in - time systems, Scheduling in Manufacturing, Theory of constraints and synchronous manufacturing.

INVENTORY MANAGEMENT

Basic Inventory systems, Inventory systems under risk, Distribution inventory management, Supply chain management.

*References: 1. Lee J.Krajewski,LarryP.Ritaman," Operations Management ",Addison-Wesley,2000.
2. SeetharamaL.Narasimhan,DennisW.McLeavy,Peter J .Billington, " Producion planning and inventory control ", PHI, 1997. 3. Monks J.G., "Operations Management", John Wiley,1999.*

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45Total No of periods:

PR 653 ANALYSIS AND CONTROL OF MANUFACTURING SYSTEM

Production system –Forecasting and its types – Forecasting errors and tracking signals
- Inventory costs Terminology of Inventory systems – Inventory policies –Analysis of Static Deterministic Inventory Models Aggregate Production Planning - Value stream management for lean office Introduction to material requirements planning - Lot sizing – MRP Versus MRP II – Software structure of MRP – Re planning frequency in MRP Introduction to Job Sequencing – n Jobs, One machine – n Jobs, Two machines – n

Jobs, Three machines – n jobs - Two Jobs , M Machines – n jobs, M Machines – sequencing Jobs on Parallel Machines – Minimization of Setup costs - Travelling Salesman problem –Job shop scheduling – Assembly line balancing

REFERENCES

1. *Elsayed A. Elsayed and Thomas O. Boucher , “ Analysis and Control of Production Systems,Printice Hall Publn., 1994.*
2. *Monks J.G., “ Operations Management, John Wiley, 1992.*
3. *Buffa,E.S. andSarin, R.K. ,” Modern production /Operations Management”, John Wiley & Sons, 1994.*

EPRIE202: OPERATIONS PLANNING AND CONTROL SYSTEMS

Periods per week: 4 End Examination: 60 Sessionals: 40

UNIT-I

Manufacturing Planning and Control (MPC): MPC systems, MPC system payoff, Hierarchy of managerial decisions, MPC system framework, Type of configurations manufacturing system, Options in dealing with the hierarchy of decisions.

Enterprise Resource Planning (ERP): What is ERP, ERP and functional units, How MPC fits within ERP, Performance measures.

UNIT-II

Demand Management: Demand management and MPC environment, Communicating with other MPC modules and customers, Forecasting framework; Time series analysis - Individual-item, short- term forecasting models, Forecast errors, Forecast error over lead time, Interval estimate, Special classes of individual items; Coefficient of correlation

UNIT-III

Sales and Operation Planning: Nature of sales and operation planning, Relevant costs, Sales and operation planning methods.

Master Production Schedule (MPS): Nature of MPS, MPS Techniques, Time fencing and MPS stability, Structuring BOM, Final assembly schedule, Managing the MPS, Disaggregation techniques.

UNIT- IV

Material Requirement Planning (MRP): Nature of MRP, MRP records, MRP logic, Technical Issues, Using the MRP system, System Dynamics, Lot sizing methods, Buffering concepts, System nervousness

UNIT-V

Production Activity Control: Framework, Shop floor control concepts, Techniques, Performance measures, Gantt chart, Finite loading systems, Priority sequencing rules, General job shop scheduling - Static, deterministic job shop - Dynamic, probabilistic job shop

Text Book

Production Planning and Inventory Control, Seetharama L. Narasimhan, Dennis W. McLeavy and Peter J. Billington Second Edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2000.

References:

1. Manufacturing Planning and Control for Supply Chain Management, Thomas E. Vollmann, William L. Berry, D Clay Whybark, and F. Robert Jacobs Fifth Edition, McGraw Hill, International Edition. 2005. 2.Inventory Management and Production Planning and Scheduling, Edward A. Silver, David F. Pyke and Rein Peterson Third Edition, John Wiley & Sons, 1998.
2. 3.Production/Operations Management, Richard J. Tersine, Second Edition, North Holland, 1985. 4.Production and Inventory Management, Y A. C. Hax and D. Candea Prentice-Hall, Englewood Cliffs, NJ, 1984. 5.Operation Management- Strategy and Analysis, Lee Krajewski and Larry P. Ritzman, Addison- Wesley (2000). 6.Operations Management: Theory and Problems Monk, J.G., McGraw Hill, NY, 1985.

2MTIE4.ANALYSIS AND CONTROL OF MANUFACTURING SYSTEM Course No.: 2MTIE4

Course Title:Analysis And Control Of Manufacturing System L-T-P Structure: 3-1-0

Maximum Marks Theory: 125

Production system –Forecasting and its types – Forecasting errors and tracking signals - Inventory costs Terminology of Inventory systems – Inventory policies –Analysis of Static Deterministic Inventory Models Aggregate Production Planning - Value stream management for lean office Introduction to material requirements planning - Lot sizing – MRP Versus MRP II – Software structure of MRP – Re planning frequency in MRP Introduction to Job Sequencing – n Jobs, One machine – n Jobs, Two machines – n Jobs, Three machines – n jobs - Two Jobs , M Machines – n jobs, M Machines – sequencing Jobs on Parallel Machines – Minimization of Setup costs - Travelling Salesman problem –Job shop scheduling – Assembly line balancing
REFERENCE BOOKS:

- Analysis and Control of Production Systems,Elsayed A. Elsayed and Thomas O. Bouche, Prentice Hall Publ., 1994.
- Operations Management, Monks J.G., John Wiley, 1992.
- Modern production /Operations Management,Buffa,E.S. andSarin, R.K., John Wiley & Sons, 1994.