GUJARAT TECHNOLOGICAL UNIVERSITY

MECHANICAL (INDUSTRIAL ENGINEERING) (46)

OPERATIONS PLANNING AND CONTROL TECHNIQUES

SUBJECT CODE: 3712811

SEMESTER: I

Type of course: Program Elective II

Prerequisite:

Rationale: The aim of this course is to make students understand and appreciate the importance of demand forecasting and demand management of products. Students can get acquainted with different inventory models and inventory analysis. The course is also aimed at imparting knowledge of Theory of Constraints.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE(E)	PA (M)	PA (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Contents:

Sr. No.	Topic	Total Hours	% Weightage
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	02	06
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.	12	28
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	10	24

	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.		
4	**Inventory and Shop –Floor Control:** Independent and Dependant Demands, Purchase Model with Instantaneous Replenishment (Without and Without Shortages), Manufacturing Model (With and Without shortages), Quantity Discounts, Fixed Order Quantity System, Periodic Review System, ABC, XYZ, VED, FSN and SDE Analysis,Shop-Floor Control (Tools of Shop-Floor Control, Gantt charts), Improving Shop Performance.	12	28
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	14
		42	100

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

Course Outcome:

After learning the course the students should be able to…

1) Understand the concepts of demand forecasting and forecasting errors.
2) Understand and able to apply Demand Management methods.
3) Understand and appreciate Production Planning and Control activities.
4) Get acquainted to MRP, MRP-II, and ERP concepts.
5) Know about various material inventory models.
6) Understand and able to carry out inventory analysis.
7) Understand the concepts of Synchronous Manufacturing and Theory of Constraints.

List of Experiments:

1) Study of Manufacturing Planning and Control system.
2) Exercise on Demand Forecasting and Forecasting errors.
3) Exercise on Demand Management methods.
4) Study the aspectsof Production Planning and Control.
5) Exercise on Material Requirement Planning and Manufacturing Requirement Planning.
6) Exercise on various Inventory models.
7) Exercise on different Inventory Analysis methods.
8) Study of Synchronous Manufacturing and Theory of Constraints Concepts - Bottleneck and capacity constrained resources, Drum-Buffer-Rope Analogy and Hockey stick phenomenon.

Open Ended Problems:

1) Students can have hands on practices on Demand Management Case Study. (If data are available management of demand using appropriate method, otherwise case study studied from research papers.
2) Students can evaluate the Material Inventory Case study (Collect the material inventory data for at least 6 months, select appropriate model and get solution).

Major Equipment: Nil

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.