

ELECTIVE SUBJECTS	
3.6	PRODUCTION AND OPERATIONS MANAGEMENT 3.6.1. ADVANCED PRODUCTION SYSTEMS. 3.6.2. AGILE AND LEAN MANUFACTURING. 3.6.3. ENTERPRISE RESOURCE PLANNING

3.6.1 ADVANCED PRODUCTION SYSTEMS

1. GENERAL INFORMATION

No.of Credits	4
No.of Hours Per Week	4

2. PERSPECTIVE OF THE COURSE

Advanced Production System is crucial to the competitiveness and sustainability of all types of organisations. It is challenging because the ever-changing nature and dynamics of the business environment require organisations to continually adapt their productions and operations to new requirements, demands, situations and expectations in the market. And it is stimulating because, in order to make productions really contribute to the competitiveness and success of an organisation, productions managers have to be active, creative and innovative in improving the company's production system with advanced techniques. **3.**

COURSE OBJECTIVES AND OUTCOMES

OBJECTIVES

- To exhibit a basic understanding of production systems.
- To develop an understanding of how the productions, have strategic importance and can provide a competitive advantage in the workplace.
- To train students on various techniques of production planning and control, product design and development, production scheduling and the importance of productivity in manufacturing.
- To provide knowledge on the green and agile manufacturing techniques of production management.

OUTCOMES

On completion of this course, the students will be able to

Identify the types of production system and various transformation processes to enhance productivity and competitiveness. 2. Analyse and evaluate various production systems and product designs, develop a balanced line of production & scheduling and sequencing techniques in production environments

4. COURSE CONTENT AND STRUCTURE

MODULE1: PRODUCTION SYSTEMS

8 HOURS

Need and Importance of Production Systems, Stages of Production System Life Cycle, Decisions in the life cycle of a production systems, Modeling and Architecture for Production and Manufacturing Systems, Automation in Production Systems. :

MODULE2: PRODUCTION PLANNING AND CONTROL

10 HOURS

Introduction to Production Planning, Production Planning Models, Forecasting: Subjective and Objective forecasting methods, Characteristics of Forecasting Problems. Strategies for Aggregate Production Planning: Resource Planning, Material Requirement Planning, MRP System, Capacity Requirement Planning, MRP II, Enterprise Resources Planning.

MODULE3: PRODUCT PLANNING AND DEVELOPMENT

10 HOURS

Product Design, Capacity Planning, Process Selection and Facility layout Selection, Product Life Cycle and its Stages, Product Development Process in the changing global environment: Stages of Product Development- Early Design, Detailed Design, Prototyping and Manufacturing, Servicing, Discard/Recycle. Product Development Organisation: Concurrent Engineering- CE Design, Methodologies.

MODULE 4: PRODUCTION SCHEDULING

8 HOURS

Introduction to Production Scheduling, Scheduling Objectives, Scheduling Models, Gantt Charts, Scheduling Environment and Constraints. Planning and Scheduling of Production Systems: Tools and techniques, Problems, Scheduling Decisions. Introduction to Production Scheduling Software.

MODULE 5: PRODUCTIVITY IN MANUFACTURING

10 HOURS

Productivity Improvement, Importance of Improved Productivity, Techniques of Productivity Improvement, Techniques of Measurement of Productivity Improvement: Work Study and Work Measurement. Role of Automation in Productivity Improvement.

Production Management System: Role of MIS in Production, Schematic representation of Production Management System, Decision Making through MIS in Production.

MODULE 6: GREEN AND AGILE MANUFACTURING

10 HOURS

Introduction, Agility through Group Technology, Concept of FMEA, JIT, SMED, KANBAN, SCM, Sustainable Manufacturing Systems. Digital Manufacturing: Functions of Digital Manufacturing, Manufacturing Simulation and Validation, role of Robust in manufacturing, Design for Manufacturing: Functions, Aesthetics, Environment, Reuse, Recycle and Re-manufacturing.

5. PEDAGOGY

Emphasis have to be given on class room teaching, practices like problem solving should be the part of explanation and compulsory mini project assignments to be given to enhance the students understanding of the subject. Production related videos can also be used to demonstrate the functioning of production units in organisations

6. TEACHING/LEARNING RESOURCES

ESSENTIAL READING

1. Martand T. Telsang, "Production Management", S Chand & Company Pvt Ltd
2. MartandTelsang, "Industrial Engineering Production Management", S Chand & Company Pvt Ltd
3. K. Hans Raj, S. N. Dwivedi, D. S. Mishra, Alok K. Verma, C. Patvardhan. (2012). Agile Manufacturing Systems: Approach for Enhancing Agility of Organisations and Processes. Narosa Publishing House.
4. Ohno, T. (1988). Toyota production system: beyond large-scale production. crc Press.
5. Kumar, S. A., & Suresh, N. (2006). Production and operations management. New Age International.

REFERENCES

1. Groover, M. P. (2016). Automation, production systems, and computer-integrated manufacturing. Pearson Education India.
2. Panneerselvam, R. (2012). Production and operations management. PHI Learning Pvt. Ltd..
3. Martinich, J. S. (2008). Production and operations management: An applied modern approach. John Wiley & Sons.
4. Chowdiah, M. P. (2011). Agile Manufacturing: Globalised Customerised Green Products. I. K International Publishing House.

3.6.2. AGILE AND LEAN MANUFACTURING

1.GENERAL INFORMATION

No.of Credits	4
No.of Hours Per Week	4

2. PERSPECTIVE OF THE COURSE

The organization requirements vary industry to industry and Lean Manufacturing has always been challenge. Every business function needs Lean Management FMCG to Industrial products which involves raw materials to produce a finished product. This mean every stage of Manufacturing – required to understand and analyzing production planning and control tools for efficient production systems. This helps senior management to take decisions. Lean Management helps in decision making and helps to eliminate waste in the production Process problems.

3. COURSE OBJECTIVES AND OUTCOMES

OBJECTIVES

To Demonstrate basic understanding of concepts about Lean Manufacturing

To Understanding real-time lean manufacturing data requirements through best practices adopted by organizations

OUTCOMES

Exhibit critical thinking capabilities that are necessary to interpret them as requirement by the management

Acquire competency in the area of forecasting, creating reports, for seamless decision making

4. COURSE CONTENT AND STRUCTURE

MODULE1: AGILE AND VALUE CREATION 8 HOURS

Role of value in Lean and Agile Environment: Lean Philosophy, Agile Philosophy, Lean and Agile value creation, Product development in Lean and Agile value creation , Minimum Viable Product (MVP), Iterative breakdown to find MVP, Modern Approach to Business and Value

MODULE 2 : LEAN MANAGEMNT 10HOURS

Need & Importance of Lean Management, Approach for Identifying Productivity Improvements, Process Flow diagram, Inventory & material Purchase, Cellular Manufacturing, Material Flow, Automation, Quick Changeover, Quality Control , 5S Principals and Implementation, Preventive Maintenance. Types of Seven waste, causes and effects, and stock less production.

MODULE3: PLANNING & CONTROL 08 HOURS

The Manufacturing Planning and Control System, Closed Loop system, Planning & control Process, Manufacturing Planning and control activities, Business Planning, sales and operations Planning. Master Production Scheduling (MPS)

MODULE 4 : LEAN MANUFACTURING TOOLS & TECHNIQUES 10 HOURS

Lean Manufacturing Tools & techniques, 3 Toolboxes for Lean Manufacturing, Tool 1: From 5S to Kanban, Cellular Manufacturing, Kaizen, and Kanban. Tool 2: Lean Metrics to Standard Rate, Lean Office, Single Minute Exchange of Die (SMED), Tool 3: Takt time to Workflow diagram, Total Productive Maintenance, Value Stream Mapping,

MODULE 5 : JIDOKA

8 HOURS

Jidoka – Introduction, process, comparison, Principles of Jidoka, Jidoka Problem Solving, benefits Jidoka, and a study on Toyota Production Systems. Lean & Green, Lean Manufacturing & Environment, difference between Lean & green Manufacturing,

MODULE 6: SCRUM

12 HOURS

SCRUM frame work: Introduction to SCRUM framework ; SCRUM roles : Product owner role, SCRUM Master role , The SCRUM Team; Product backlog , Requirement levels ; SCRUM Story : User Story and Acceptance levels , Sizing stories and Relative sizing, Good User Story attributes; SCRUM Ceremonies , Sprint Planning , Stand up (Daily SCRUM meeting), Backlog refinement (grooming) , Measuring team velocity , Burn UP and Burn Down Charts , Sprint review and Sprint retrospective

5.PEDAGOGY

The Agile and lean manufacturing the concepts used in all advanced production systems. The use of videos on advanced production systems and discussions on how the Agile , Lean and SCRUM are used in different stages of production management. Case studies must be used for all modules.

6.TEACHING/LEARNING RESOURCES

ESSENTIAL READINGS

- 1. Lean Manufacturing: Business Bottom-Line Based - By John X Wang**
- 2. Lean Manufacturing Implementation – Dennis P. Hobbs**

REFERENCES

- 1. Lean Manufacturing – John W Davis**
- 2. Six Sigma for optimal System Performance in Manufacturing and Service Organizations - Edem g Tetteh – Rowan College at Burlington, Country USA**
- 3. Hans Chapman – Cape Fear Community College USA**
- 4. Essential Scrum: A Practical Guide To The Most Popular Agile Process by Kenneth S. Rubin*

3.6.3. ENTERPRISE RESOURCE PLANNING

1. GENERAL INFORMATION

No. of Credits	4
No. of Hours Per Week	4

2. PERSPECTIVE OF THE COURSE

Enterprise resource planning is to make them aware of real time requirements in resource planning, automation of documentation and decision process, and industry preparedness. The organization requirements vary industry to industry. By running the ERP system, the organization can gain speed, efficiency, and accuracy in its business operations. Through automation and integration, the system increases the organization's productivity while reducing time and labour costs.

3. COURSE OBJECTIVES AND OUTCOMES

OBJECTIVES

To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning Technology.

To focus on a strong emphasis upon practice of theory in Applications and Practical oriented approach.

OUTCOMES

To train the students to develop the basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.

To aim at preparing the students technological competitive and make them ready to self-upgrade with the higher technical skills.

4. COURSE CONTENTS AND STRUCTURE

MODULE1: INTRODUCTION

10 HOURS

Overview of Enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to be considered in planning design and implementation of cross functional integrated ERP systems, Case studies

MODULE2: ERP SOLUTIONS AND FUNCTIONAL MODULES

10 HOURS

Overview of ERP software solutions- Small medium and large enterprise vendor solutions, BPR, Business Engineering and best Business practices - Business process Management. Overview of ERP modules -sales and Marketing, Accounting and Finance, Materials and Production management etc. Quality Management - Functions of Quality Management; CAQ and CIQ; Materials Management- Pre-purchasing; Purchasing; Vendor Evaluation; Inventory Management and Invoice Verification and Material Inspection

MODULE3: ERP AND RELATED TECHNOLOGIES

10 HOURS

Business Process Re-engineering, Management Information systems, Decision Support Systems, Executive Information Systems- Advantages of EIS; Disadvantages of EIS, Data Warehousing, Data Mining, On-Line Analytical Processing, Product Life Cycle Management, Supply Chain Management, ERP Security

MODULE 4 : ERP IMPLEMENTATION

10 HOURS

Planning Evaluation and selection of ERP systems-Implementation life cycle - ERP implementation, Methodology and Framework- Training – Data Migration. People Organization in implementation-Consultants, Vendors and Employees, Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of and ERP Implementation

MODULE 5: ERP VENDORS**08 HOURS**

ERP Vendors, SAP-AG: Products and technology R/3 overview; SAP advantage, Baan Company , Oracle Corporation: Products and technology; Oracle Application; Vertical solutions, Microsoft Corporation, Ramco Systems, Systems Software Associates Inc. (SSA), QAD

MODULE 6: EMERGING TRENDS IN ERP**08 HOURS**

Extended ERP systems and ERP bolt on CRM, SCM, Business analytics, ERP to ERP II-Implementation of Organisation Wide ERP, Development of New Markets and Channels, Latest ERP Implementation Methodologies, ERP and E-business, Market Snapshot, The SOA Factor.

5. PEDAGOGY

The ERP paper is to develop an insight on the resource planning on documentation and decision making process. Hence, a mini project can be suggested to analyze different ERP programs commercially available and open source programs. A mini project can be used to explain how to develop a ERP system for a small firm. Case studies can be used to explain different concepts in ERP .

6. TEACHING/LEARNING RESOURCES**ESSENTIAL READINGS**

1. Enterprise Resource Planning Alexis Leon McGraw Hill
2. Enterprise Resource Planning ,Mary Summer Pearson; 1 Edition

REFERENCES

2. Alexis Leon, ERP demystified, second Edition Tata McGraw-Hill, 2006.
- 2.Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill,
3. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill,
4. Mahadeo Jaiswal and Ganesh Vanapalli, ERP, Macmillan India,
5. Vinod Kumar Garg and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India,
6. Summer, ERP, Pearson Education,

MODULE 4: RESOURCE OPTIMIZATION IN PROJECT MANAGEMENT**8 HOURS**

Resource planning, Resource levelling and Resource smoothing; Quality Function Deployment in Project Management (Industry Standard); Sensitivity Analysis – Overview, Methods and Techniques, Interpretation of solution.

MODULE 5: PROJECT RISK MANAGEMENT**10 HOURS**

Risk Management Process – Risk Identification, Risk Assessment; Risk Response Development – Mitigating Risk, Avoiding Risk, Transferring Risk; Risk Management in organizations; Risk Management methodologies; Improvement methodologies.

MODULE 6: CONTINGENCY PLANNING**10 HOURS**

Contingency Planning – Technical Risk, Schedule Risk, Cost Risk, Funding Risk, Environmental Risk, Business Continuity Plan, Disaster Recovery; Opportunity Management; Contingency Funding and Time Buffers – Budget Reserves, Management Reserves, Time Buffers; Risk Response Control; Change Control Management.

5.PEDAGOGY:

Emphasis have to be given on class room teaching, practices like problem solving should be the part of explanation and compulsory mini project assignments to be given to enhance the students understanding of the subject. Identification and development of self as a resource. Event planning, management and evaluation with reference to – Managerial Process, Resource Optimization. Case studies can be used to explain concepts wherever possible.

6.TEACHING/LEARNING RESOURCES**ESSENTIAL READINGS**

1. Gerardus Blokdyk, “Resource Optimization A Complete Guide - 2020 Edition”, 5starcooks Publication.
2. Manoj Kumar, “Resource Optimisation Through Environmental Leadership”, K W Publishers Pvt Ltd.

REFERENCES

3. Barnali Roy Choudhury, “Resource optimization”, UNESCO 2015.
4. Anand J. Kulkarni, Suresh Chandra Satpathy, “Optimization in Machine Learning and Applications”, Springer.
5. Project Management Institute’s Project Management Body of Knowledge (PMBOK) ©
6. Clifford F. Grey, Erik W. Larson, Gautam V. Desai, “Project Management – The Managerial Process”, Tata McGraw Hill Publication.

4.6.2.SUPPLY CHAIN MANAGEMENT

1.GENERAL INFORMATION

No.of Credits 4

No.of Hours Per Week 4

2.COURSE PERSPECTIVES

Every business function needs supply chain from FMCG to Industrial products which involves raw materials to produce a finished product. This mean every stage of supply chain - involvement of suppliers, manufacturing, banking, insurance, and customers are critical. This helps senior management to take decisions. Supply Chain helps in decision making and helps to solve complex supply chain problems.

3.COURSE OBJECTIVES AND OUTCOME

OBJECTIVES

1. Demonstrate basic understanding of concepts about supply chain management
2. Understanding real-time supply chain data requirements through best practices adopted by organizations

OUTCOME

At the end of the course student can Exhibit critical thinking capabilities that are necessary to interpret them as requirement by the management andAcquire competency in the area of forecasting, creating reports for seamless decision making

3. COURSE CONTENT AND STRUCTURE

MODULE1: INTRODUCTION TO SUPPLY CHAIN MANAGEMENT 10 HOURS

Introduction and Concept of Supply Chain Management – Evolution of Supply Chain Management –Evolving Structure of Supply Chain (Old versus New) – Difference between Logistics versus Supply Chain Management –Partners in the Supply Chain Structure – Supply Chain Design

Supply Chain Visibility – Planning–Execution – Finance – Infrastructure – Operations – Supply Chain Facilities Layout – Lead Time – SafetyStock – Stock Keeping Units (SKUs) –Cross Docking – Difference between Replenishment and Fulfillment Replenishment order, Recorder Point Models – Multichannel Inventory systems –Inventory optimization – Inbound and Outbound Logistics, Reverse Logistics, Supply Chain Integration – Supply Chain Performance

MODULE 2 SUPPLY CHAIN MODELS 8 HOURS

Types of Supply Chain Models - The continuous flow models - The fast chain models - The efficient chain models - The custom configured model - The agile model - The flexible model - Supply Chain Operations Reference Model (SCOR Model) – SupplyChain Risks Modeling and Management

MODULE 3 PROCEDURES AND DOCUMENTATION 08 HOURS

International Trade Procedures & Documentation , IEC Codes or The Harmonized System, Inland Container Depots (ICD), Free on Board, Types of Warehouses –Customs Bonded Warehouses, Custom Broker, INCO Terms, Documents requirement for shipments – Automated Export Systems – UN convention on shipping information

MODULE 4 WMS AND MATERIAL HANDLING EQUIPMENTS 10 HOURS

Warehouse Management Systems – Location of the Ware house – Types of WMS – Warehouse Contracts –TheWarehousing (Development and Regulation) Act, 2007–Warehouse Safety and Security

IndustrialMaterial Handling Equipment, Types of Material Handling Equipment’s –Packaging and Labeling

MODULE 5: DISTRIBUTION MANAGEMENT 12 HOURS

Role of Transportation in Supply Chain – Challenges in Transportation – Transportation Strategies – Transport Management System – Route Management Planning - Dynamic Routing and Scheduling – Factors to be considered for Route Optimization – Route Analysis – Multimodal Transportation – Distribution Management– The Role of Distribution in Supply Chain Management - Role of intermediaries including freight booking, shipping agents, C&F agents

Characteristics – - Conference Chartering operation- Freight structure and practices – Chartering principles and practices

Air transportation – Carrier consignee liabilities – Cargo handling – Information Support System.

MODULE 6: IT DRIVEN AND GREEN SUPPLY CHAIN MANAGEMENT 08 HOURS

Supply Chain Software - Supply Chain-Related IT Costs –Relation to ERP: E-procurement – E-Logistics – e- Auctions - – E-markets – E- Business Process.

Green Supply Chain Management – Corporate Initiatives in the area of green supply chain – Case Studies from Indian and Global supply chain companies

5.PEDAGOGY

The supply chain management subject covers material movement, warehousing and inventory planning. Case studies must be used in all modules. Industry visit to Warehouses will give an insight to the material handling system. A mini project can be used for understanding procedures and documentation.

6.TEACHING/LEARNING RESOURCES

ESSENTIAL READINGS

1. Coyle, Langley, Novack, and Gibson, “Supply Chain Management A Logistics Perspective”, Cengage Publications 9 Edition
2. Rajat K Baisya, “Integrated Supply Chain and Logistics Management” Sage Publications, New Delhi

Sunil chopra, Meindl & Kalra, “Supply Chain Management”, Pearsons Education, India, 2009

REFERENCES

- 1.Janet Shah, “Supply Chain Management Texts and Cases”, Pearsons Education
- 2.Edward G. Hinkelman, “International Trade Documentation the Documents of Exporting, Importing, Shipping and Banking”, World Trade Press
- 3.Langley, Coyle, Gibson, Novack, and Bardi “Managing Supply Chains – A Logistics Approach”, Cengage Publications
- 4.Shipping Documents and Reports, UNCTAD (<https://unctad.org/en/pages/PublicationWebflyer.aspx?publicationid=2563>)
- “INCO Terms 2020”, International Chamber of Commerce (<https://iccwbo.org/resources-for-business/incoterms-rules/incoterms-2020/>)
- 5.Lambert, D, “Strategic Logistic Management”, Tata McGraw Hill, New Delhi
- 6.Asopa, V.N Shipping Management Cases and Concepts, Macmillan, New Delhi
- 7.Satish K. Kapoor & Purva Kansal, “Basica of Distribution Management - A Logistical Approach”, Prentice Hall India, 2003
- 8.Michael Hugos “Essentials of Supply Chain Management”, Wiley Fourth Edition
- 9.Nada R Sanders “Supply Chain Management – A Global Perspective”, Wiley Second Edition
- 10.John Mangan, Chandra Lalwani, “Global Logistics and Supply Chain Management, Wiley Third Edition

4.6.3. TOTAL QUALITY MANAGEMENT

1.GENERAL INFORMATION

No.of Credits 4

No.of Hours Per Week 4

2.COURSE PERSPECTIVES

The primary aim of training students in TQM is to give them in-depth knowledge of quality and quality control and TQM and prepare students to use and application of quality assurance tools. Give them in depth Knowledge of the management aspects of Total quality management development which prepare students to create satisfied customers which is essence of any business today .

3.COURSE OBJECTIVES AND OUTCOME

OBJECTIVEZ

To Develop Ability in students to apply the tools, techniques and principles of Total Quality Management

To create an understanding which enable the students to Appreciate and adopt the application of quality management principles in the development of organizations

OUT COMES

The students should realize the importance of significance of quality and be able to manage quality improvement teams in organization

The students should develop the Ability to apply the concepts of **total quality management** for investigation and synchronization of manufacturing processes service processes.

4.COURSE CONTENT AND STRUCTURE

MODULE1: INTRODUCTION TO TOTAL QUALITY MANAGEMENT 8 HOURS

Introduction to Quality and Quality Control TQM, TQM framework, benefits, awareness and obstacles. Customer Focus – customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product , service quality and Cost of quality.

MODULE2: PRINCIPLES OF QUALITY MANAGEMENT 8 HOURS

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi techniques – introduction of loss function, parameter and tolerance design, signal to noise ratio. Japanese 5S of house keeping, and 8D methodology.

MODULE 3 : PROCESS CONTROL AND CAPABILITY 12 HOURS

Meaning and significance of statistical process control (SPC) – construction of control charts for variables and attributed. - problems

Process capability – meaning, significance and measurement – Six sigma concepts of process capability.

Reliability concepts – definitions, reliability in series and parallel, product life characteristics curve.Total productive maintenance (TPM) – relevance to TQM, Terotechnology. Business process re-engineering (BPR) – principles, applications, reengineering process.

MODULE 4: TQM TOOLS AND TECHNIQUES 12 HOURS

Quality functions development (QFD) , Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) –Quality tools,Bench marking and POKA YOKE.

MODULE5: QUALITY MANAGEMENT SYSTEMS 8 HOURS

Scope and application of ISO9000- 2000. Design and implementation of Quality Systems. Auditing requirements of ISO9000-2000. QS- 9000.

MODULE 6: BEHAVIOURAL ASPECT OF TOTAL QUALITY MANAGEMENT 8 HOURS

Quality circles , kaizen , vendor management quality audits. TQM culture, leadership – quality council, employee involvement, motivation, empowerment, recognition and reward- introduction to software quality.

5.PEDAGOGY

- The lectures should be supplemented by case studies in each module to which enhance students' analytical, problem solving and decision making skills.

6.TEACHING/LEARNING RESOURCES

1. Dale H.Besterfield et al, Total Quality Management, Third edition, Pearson Education
(First Indian Reprints 2002)
2. Shridhara Bhat K, Total Quality Management – Text and Cases, Himalaya Publishing House, First Edition 2017
3. S.D Bagde, Total Quality Management - Himalaya Publishing House, First Edition 2017
4. TQM A pictorial Guide for managers -John Oakland and Peter Morris 2011