

Stream/ Specialization : **Operations Management**

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	BA4021	Supply Chain Management	PEC	3	0	0	3	3
2.	BA4022	Quality Management	PEC	3	0	0	3	3
3.	BA4023	Materials Management	PEC	3	0	0	3	3
4.	BA4024	Services Operations Management	PEC	3	0	0	3	3
5.	BA4025	Supply Chain Analytics	PEC	3	0	0	3	3
6.	BA4026	Project Management	PEC	3	0	0	3	3

**COURSE OBJECTIVE:**

- To help understand the importance of and major decisions in supply chain management for gaining competitive advantage.

**UNIT I INTRODUCTION****9**

Supply Chain – Fundamentals, Evolution, Role in Economy, Importance, Decision Phases, Enablers & Drivers of Supply Chain Performance; Supply chain strategy; Supply Chain Performance Measures.

**UNIT II SUPPLY CHAIN NETWORK****9**

Distribution Network Design – Role in supply chain, Influencing factors, design options, online sales and distribution network, Distribution Strategies; Network Design in supply chain – Role, influencing factors, framework for network design, Impact of uncertainty on Network Design.

**UNIT III PLANNING DEMAND, INVENTORY AND SUPPLY****9**

Managing supply chain cycle inventory and safety inventory - Uncertainty in the supply chain , Analyzing impact of supplychain redesign on the inventory, Risk Pooling, Managing inventory for short life-cycle products, multiple item -multiple location inventory management; Pricing and Revenue Management.

**UNIT IV LOGISTICS****9**

Transportation – Role, Modes and their characteristics, infrastructure and policies, transport documentation, design options, trade-offs in transportation design, intermodal transportation. Logistics outsourcing – catalysts, benefits, value proposition. 3PL, 4PL, 5PL, 6PL; International Logistics -objectives, importance in global economy, Characteristics of global supply chains, Incoterms.

**UNIT V SUPPLY CHAIN INNOVATIONS****9**

Supply Chain Integration, SC process restructuring, IT in Supply Chain; Agile Supply Chains, Legible supply chain, Green Supply Chain, Reverse Supply chain; Supply chain technology trends – AI, Advanced analytics, Internet of Things, Intelligent things, conversational systems, robotic process automation, immersive technologies, Blockchain.

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

1. Understanding of supply chain fundamentals
2. Ability to design supply chain networks to enhance supply chain performance
3. Ability to plan demand based on inventory and supply
4. Understanding the role of logistics in supply chain performance
5. Awareness of innovations for sustainable supply chains

**REFERENCES:**

1. Sunil Chopra, Peter Meindl and DharamVirKalra, Supply Chain Management -Strategy Planning and Operation, Pearson Education, Sixth Edition, 2016.
2. Janat Shah, Supply Chain Management – Text and Cases, Pearson Education, 2009
3. Ballou Ronald H, Business Logistics and Supply Chain Management, Pearson Education, 5<sup>th</sup> Edition, 2007.
4. David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, Designing and Managing the Supply Chain: Concepts, Strategies, and Cases, Tata McGraw-Hill, 2005.
5. Pierre David, International Logistics, Biztantra, 2011.

**COURSE OBJECTIVE:**

- To learn the various principles and practices of Quality Management

**UNIT I INTRODUCTION****9**

Introduction - Need for quality - Evolution of quality - Definition of quality. Concept of Quality –different perspectives. Concept of total Quality – Design, inputs, process and output - Attitude and involvement of top management. Customer Focus – customer perception - customer retention. Dimensions of product and service quality. Cost of quality.

**UNIT II QUALITY MANAGEMENT PHILOSOPHIES AND PRICIPLES****9**

Quality Gurus - Crosby, Deming, Masaaki Imai, Feigenbaum, Ishikawa, Juran, Oakland, Shigeo Shingo, and Taguchi. Concepts of Quality circle, Japanese 5S principles and 8D methodology.

**UNIT III STATISTICAL PROCESS CONTROL****9**

Statistical Process Control (SPC) – Meaning, Significance. construction of control charts for variables and attributes. 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 (TMP), Terotechnology. Business process Improvement (BPI) – principles, applications, reengineering process, benefits and limitations.

**UNIT IV QUALITY TOOLS AND TECHNIQUES****9**

Quality Tools - The seven traditional tools of quality, New management tools. Six-sigma, Bench marking, Poka-yoke, Failure Mode Effect Analysis (FMEA) – reliability, failure rate, FMEA stages, design, process and documentation. Quality Function Deployment (QFD) – Benefits, house of quality. Taguchi - quality loss function, parameter and tolerance design, signal to noise ratio.

**UNIT V QUALITY MANAGEMENT SYSTEMS****9**

Introduction Quality management systems – IS/ISO 9004:2000 – Quality System –Elements, Documentation guidelines for performance improvements. Quality Audits - QS 9000 – ISO 14000 – Concepts. TQM -culture, framework, benefits, awareness and obstacles. Employee involvement – Motivation, empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal. Supplier - Selection, Partnering, Supplier Rating.

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

1. Understanding the evolution of Quality management
2. Understanding of quality philosophies and practices
3. Ability to apply statistical process control to enhance quality.
4. Ability to apply quality tools to enhance organization's quality performance
5. Awareness of quality management systems

**REFERENCES:**

1. Dale H. Besterfield, Carol Besterfield-Michna, Glen H. Besterfield, Mary Besterfield -Sacre, Hemant Urdhwareshe, Rashmi Urdhwareshe, Total Quality Management (TQM), Fifth edition, Pearson Education, 2018.
2. Shridhara Bhat K, Total Quality Management – Text and Cases, Himalaya Publishing House, First Edition 2010
3. Poornima M. Charantimath, Total Quality Management, Pearson Education, Second Edition, 2011.
4. Douglas C. Montgomery, Introduction to Statistical Quality Control, Wiley Student Edition 4th Edition, Wiley India Pvt Limited, 2008.
5. Indian standard – quality management systems – Guidelines for performance improvement (Fifth Revision), Bureau of Indian standards, New Delhi.
6. Panneerselvam. R, Sivasankaran. P, Quality Management, PHI Learning, 2014.

**COURSE OBJECTIVE :**

- To understand why materials management should be considered for profit in operations

**UNIT I INTRODUCTION****9**

Operating environment-aggregate planning-role, need, strategies, costs techniques, approaches-master scheduling-manufacturing planning and control system-manufacturing resource planning-enterprise resource planning-making the production plan

**UNIT II MATERIALS PLANNING****9**

Materials requirements planning-bill of materials-resource requirement planning-manufacturing resource planning-capacity management-scheduling orders-production activity control-codification.

**UNIT III INVENTORY MANAGEMENT****9**

Policy Decisions-objectives-control -Retail Discounting Model, Newsvendor Model; Review of deterministic models, Probabilistic inventory models.

**UNIT IV PURCHASING MANAGEMENT****9**

Establishing specifications-selecting suppliers-price determination-forward buying-mixed buying strategy-price forecasting-buying seasonal commodities-purchasing under uncertainty-demand management-price forecasting-purchasing under uncertainty-purchasing of capital equipment-international purchasing

**UNIT V WAREHOUSE MANAGEMENT****9**

Warehousing functions – types - Stores management-stores systems and procedures-incoming materials control-stores accounting and stock verification-Obsolete, surplus and scrap-value analysis-material handling-transportation and traffic management -operational efficiency-productivity-cost effectiveness-performance measurement

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

1. Understanding basics of materials management
2. Understanding requirement analysis for material planning
3. Ability to apply inventory management models
4. Understanding purchasing practices
5. Understanding storage in warehouse

**REFERENCES :**

1. J.R.Tony Arnold, Stephen N. Chapman, Lloyd M. Clive, Materials Management, Pearson, 2012.
2. P. Gopalakrishnan, Purchasing and Materials Management, Tata McGraw Hill, 2012
3. A.K.Chitale and R.C.Gupta, Materials Management, Text and Cases, PHI Learning, 2<sup>nd</sup> Edition, 2006
4. A.K.Datla, Materials Management, Procedure, Text and Cases, PHI Learning, 2<sup>nd</sup> Edition, 2006
5. Ajay K Garg, Production and Operations Management, Tata McGraw Hill , 2012
6. Ronald H. Ballou and Samir K. Srivastava, Business Logistics and Supply Chain Management, Pearson education,Fifth Edition
7. S. N. Chary, Production and Operations Management, Tata McGraw Hill , 2012

**COURSE OBJECTIVE:**

- To help understand how service performance can be improved by studying services operations management

**UNIT I INTRODUCTION****9**

Services – Importance, role in economy, service sector – nature, growth. Nature of services - distinctive characteristics, Service Package, Service classification, service-dominant logic, open-systems view. Service Strategy –Strategic service vision, competitive environment, generic strategies, winning customers; Role of information technology; stages in service firm competitiveness.

**UNIT II SERVICE DESIGN****9**

New Service Development – Design elements – Service Blue-printing - process structure – generic approaches. Service Encounter – triad, creating service orientation, service profit chain; Front-office Back-office Interface– service decoupling. Technology in services – self-service, automation, e-commerce, e-business, technology innovations.

**UNIT III SERVICE QUALITY****9**

Service Quality- Dimensions, Service Quality Gap Model; Measuring Service Quality –SERVQUAL, Walk-through Audit, Quality service by design , Service Recovery, Service Guarantees. Process Improvement –productivity improvement - DEA, quality tools, benchmarking, Quality improvement programs.

**UNIT IV SERVICE FACILITY****9**

Supporting facility -Service scapes, Facility design– nature, objectives, process analysis, Service facility layout. Service Facility Location – considerations, facility location techniques – metropolitan metric, Euclidean, centre of gravity, retail outlet location, location set covering problem. Vehicle routing and Scheduling.

**UNIT V MANAGING CAPACITY AND DEMAND****9**

Managing Demand – strategies; Managing capacity – basic strategies, supply management tactics, operations planning and control; Yield management; Inventory Management in Services– Retail Discounting Model, Newsvendor Model; Managing Waiting Lines –Queuing systems, psychology of waiting; Managing for growth- expansion strategies, franchising , globalization.

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

1. Appreciation of nature of service operations
2. Ability to design services
3. Ability to inculcate quality in service design and delivery
4. Apply models to design service facility
5. Ability to grow and sustain service business

**REFERENCES:**

1. James A. Fitzsimmons, Mona J. Fitzsimmons, Sanjeev Bordoloi, Service Management – Operations, Strategy, Information Technology, McGraw-Hill Education – 8th Edition 2018.
2. Richard D. Metters, Successful Service Operations Management, Cengage Learning, 2nd Edition, 2012.
3. Cengiz Haksever, Barry Render, Service Management, Pearson Education, 2013.
4. Robert Johnston, Graham Clark, Service Operations Management, Pearson Education, 2<sup>nd</sup> Edition, 2005.
5. Bill Hollins and Sadie Shinkins, Managing Service Operations, Sage, 2006.

**COURSE OBJECTIVE:**

- To treat the subject in depth by emphasizing on the advanced quantitative models and methods in logistics and supply chain management and its practical aspects and the latest developments in the field.

**UNIT I INTRODUCTION****9**

Introduction to analytics – descriptive, predictive and prescriptive analytics, Data Driven Supply Chains – Basics, transforming supply chains, Barriers to implementation, Road Map.

**UNIT II WAREHOUSING DECISIONS****9**

Mathematical Programming Models - P-Median Methods - Guided LP Approach - Balmer – Wolfe Method, Greedy Drop Heuristics, Dynamic Location Models, Space Determination and Layout Methods

**UNIT III INVENTORY MANAGEMENT****9**

Inventory aggregation Models, Dynamic Lot sizing Methods, Multi-Echelon Inventory models, Aggregate Inventory system and LIMIT, Risk Analysis in Supply Chain - Measuring transit risks, supply risks, delivering risks, Risk pooling strategies.

**UNIT IV TRANSPORTATION NETWORK MODELS****9**

Notion of Graphs, Minimal Spanning Tree, Shortest Path Algorithms, Maximal Flow Problems, Multistage Transshipment and Transportation Problems, Set covering and Set Partitioning Problems, Traveling Salesman Algorithms, Advanced Vehicle Routing Problem Heuristics, Scheduling Algorithms-Deficit function Approach and Linking Algorithms

**UNIT V MCDMMODELS****9**

Analytic Hierarchy Process(AHP), Data Envelopment Analysis (DEA), Fuzzy Logic and Techniques, the analytical network process (ANP), TOPSIS-Application in SCM

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

1. Understanding of supply chain analytics fundamentals
2. Ability to design warehouse models to enhance supply chain performance.
3. Ability to analyse models and strategies in inventory management.
4. Ability to understand network models in transportation.
5. Ability to make decision using multi-criteria in applications of SCM

**REFERENCES :**

1. Nada R. Sanders, Big data driven supply chain management: A framework for implementing analytics and turning information into intelligence, Pearson Education, 2014.
2. Michael Watson, Sara Lewis, Peter Cacioppi, Jay Jayaraman, Supply Chain Network Design: Applying Optimization and Analytics to the Global Supply Chain, Pearson Education, 2013.
3. Anna Nagurney, Min Yu, Amir H. Masoumi, Ladimer S. Nagurney, Networks Against Time: Supply Chain Analytics for Perishable Products, Springer, 2013.
4. Muthu Mathirajan, ChandrasekharanRajendran, SowmyanarayananSadagopan, ArunachalamRavindran, ParasuramBalasubramanian, Analytics in Operations/Supply Chain Management , I.K. International Publishing House Pvt. Ltd., 2016.
5. Gerhard J. Plenert, Supply Chain Optimization through Segmentation and Analytics, CRC Press, Taylor & Francis Group, 2014.

**COURSE OBJECTIVE:**

- To learn the fundamental principles and practices of managing projects.

<b>UNIT I</b>	<b>INTRODUCTION TO PROJECT MANAGEMENT</b>	<b>9</b>
Project Management – Definition –Goal - Lifecycles. Project Environments. Project Manager – Roles- Responsibilities and Selection.		
<b>UNIT II</b>	<b>PLANNING, BUDGETING AND RISK MANAGEMENT</b>	<b>9</b>
The Planning Process – Work Break down Structure. Cost Estimating and Budgeting - Process, Summaries, schedules and forecasts. Managing risks - concepts, identification, assessment and response planning.		
<b>UNIT III</b>	<b>SCHEDULING &amp; RESOURCE ALLOCATION</b>	<b>9</b>
PERT & CPM Networks - Project durations and floats - Crashing – Resource loading and leveling. Simulation for resource allocation. Goldratt’s Critical Chain.		
<b>UNIT IV</b>	<b>PROJECT ORGANISATION &amp; CONFLICT MANAGEMENT</b>	<b>9</b>
Formal Organisation Structure – Organisation Design – Types of project organizations. Conflict – Origin & Consequences. Project Teams. Managing conflict – Team methods for resolving conflict.		
<b>UNIT V</b>	<b>CONTROL AND COMPLETION</b>	<b>9</b>
Project Control – Process, Monitoring, Internal and External control, Performance analysis, Performance Index Monitoring. Project Evaluation, Reporting and Termination. Project success and failure - Lessons.		
		<b>TOTAL: 45 PERIODS</b>

**COURSE OUTCOMES:**

1. Ability to understand the roles and responsibilities of a project manager
2. Ability to plan and budget projects
3. Ability to schedule and allocate resources to projects
4. Ability to manage project organization
5. Ability to control and complete projects

**REFERENCES :**

1. John M. Nicholas, Project Management for Business and Technology - Principles and Practice, Second Edition, Pearson Education, 2006.
2. Clifford Gray and Erik Larson, Project Management, Tata McGraw Hill Edition, 2005.
3. Gido and Clements, Successful Project Management, Seventh Edition, Thomson Learning, 2017.
4. Samuel J.M., Jack R.M., Scott M.S., Margaret M.S., and Gopalan M.R., Project Management, First Indian edition, Wiley-India, 2006.
5. Harvey Maylor, Project Management, Third Edition, Pearson Education, 2006.
6. Panneerselvam. R, Senthilkumar. P, Project Management, PHI Learning, 2009.