



MANAGEMENT OF INVENTORY SYSTEMS

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INTENDED AUDIENCE : Management, Industrial Engineering, Mechanical Engineering, Production Engineering and related disciplines.

INDUSTRIES APPLICABLE TO : Tata Steel, Tata Motors, L&T, Linde and similar such manufacturing and service organizations including IT companies

COURSE OUTLINE :

The objective of the course is to introduce the basic concepts and statistical and other quantitative techniques and methods employed in the broad area of materials management, in general and inventory control and management, in particular. Static and dynamic inventory problems under certainty, risk and uncertainty, design of inventory study and decision procedures, current approaches in inventory management, important methods and approaches in purchasing, storing, distribution, value engineering/analysis, logistics and SCM are some of the topics which are required to be covered for the students taking up this course for the first time. Such a comprehensive course is required to be offered by Mechanical Engineering, Industrial Engineering, Manufacturing/Production Engineering and related departments at undergraduate level and by Management/Business schools at the postgraduate level in any renowned university or educational institute in India and abroad. It is essential that the students studying in these disciplines at UG or PG levels should enroll themselves in this course.

ABOUT INSTRUCTOR :

Prof Pradip Kumar Ray is presently a Professor in the Department of Industrial and Systems Engineering, Indian Institute of Technology (IIT), Kharagpur, India. He served as the Head of the Department during September, 2006 to August, 2009. A mechanical engineering graduate (IEST, Shibpur) with MTech degree and PhD in industrial engineering (IIT Kharagpur), Professor Ray has about more than thirty-six years of diversified experience - eight years in industry and more than twenty-eight years of teaching and research experience at IIT Kharagpur. He has served as a visiting professor at several institutions abroad and is trained in Japan on Production Management/JIT-based Manufacturing. He has published one text book titled 'Product and Process Design for Quality Economy and Reliability', thirteen book chapters, six lecture packages, and 162 papers in international and national journals of repute and conferences in the areas of quality design and control/TQM, healthcare systems management, productivity engineering, process optimization, ergonomics/human factors engineering, safety engineering and management and other related topics. His areas of interest and research include productivity modelling, quality engineering, ergonomics, healthcare quality management, engineering asset management and JIT-based/lean engineering and operations management. He has secured substantial number (27 till date) of industry and research grants. He has supervised 17 PhD scholars till date with 6 research scholars currently working under him. He has supervised more than 119 MTech and 74 B-Tech projects till date. He has coordinated several outreach training programmes and courses (more than 45) for industries and academic institutions on several topics, such as MHRD-sponsored four GIAN courses on Engineering Asset Management, Ergonomics and Human Factors Engineering, Production and Operations Management, and Quality Engineering in Products and Processes, and other courses on SPC, TQM, Six Sigma, JIT/Lean Engineering, Materials Management, Environment Management, Workplace Stress Management and Ergonomics including long-duration training programme on Industrial Safety Engineering and Safety Competence Building (SCB) in Material Handling for Tata Steel. Currently, he acted as an investigator in two-year duration UKIERI-sponsored project on 'Climate Change Issues and Environmental Performance of SMEs in India and the UK' in collaboration with Aston Business School, Aston University, Birmingham, UK. Currently, he has acted as Chief Expert guiding APO-sponsored project on 'Research on Institutions Offering Productivity Courses' for six Asian countries, and as the Principal Investigator in MHRD and OFB-sponsored IMPRINT project on manufacture of shells for field guns with improved design and performance. He organized the International Conference, MESH-2016 in December, 2016 at IIT Kharagpur as its convener. He has attended several international conferences/congresses as a keynote speaker and a session chair.

Professor Ray is a certified Lead Assessor for ISO-9001 registration, and is a member of several professional bodies, such as INFORMS and IIMM, and a Fellow of World Academy of Productivity Sciences and a Fellow of Institution of Engineers (India).

COURSE PLAN :

Week 1 : Introduction to Inventory and Materials Management: Concepts and Issues, Types of inventory, Inventory costs and their measurement, Structure of inventory models, Importance and areas of materials management.

Week 2 : Inventory Problems and Selective Inventory Management: Classification of inventory problems, Importance-based classification of inventory, selective inventory management techniques and their use, Numerical problems.

Week 3 : Static Inventory Problems under Risk: General characteristics, Opportunity cost matrix and cost structure, Mathematical formulations (discrete and continuous cases), Imputation of costs, Numerical problems.

Week 4 : Static Inventory Problems under Uncertainty: General characteristics, Decision criteria for uncertainty and inventory problems, Distribution-free analysis (Tchebycheff and other inequalities), Comparison of analyses with full and partial information, Numerical problems.

Week 5 : Dynamic Inventory Problems under Certainty: General characteristics, Fixed Order Size System (EOQ and its variants), Economic Production Quantity (EPQ), Fixed order interval system, Inventory problem formulation and solution under constraints, Numerical problems.

Week 6 : Dynamic Inventory Problems under Risk: General characteristics, Types of inventory control systems with known stock-out costs and service levels, Approximate and exact methods for safety stock determination, Numerical problems.

Week 7 : MRP, MRP-II and DRP: Concepts and Issues of MRP, Design of MRP system and its variants (MRP-II and DRP), Numerical problems.

Week 8 : JIT-based Approaches for Materials Management: Concepts and Issues, Relationship with Lean Engineering practices, Design of JIT-based inventory management systems, Numerical problems.

Week 9 : Basics of Purchasing Management: Fundamentals and importance of industrial purchasing, Types of purchasing, Related techniques (non-quantitative and quantitative) in purchasing, Measurement and evaluation of performance of suppliers and purchasing systems, Numerical problems.

Week 10 : Theory of Constraints and Materials Management: Concept and Issues, Bottleneck and non-bottleneck resources, Process and transfer batches, Capacity constraint resources, D-B-R scheduling and VAT plants, Effect on materials management, Numerical problems.

Week 11 : Value Engineering/Analysis and Stores Management: Objectives and issues of Value Engineering/Analysis (VE/VA), Steps in VE/VA, Effects on purchasing and materials management, Basics of and approaches for stores management, Numerical problems.

Week 12 : Logistics and Supply Chain Management: Trends and issues, Push versus Pull distribution system, Basic Issues in Design for Logistics, SCM, and Greening SC, Inventory system development, Numerical problems.