

**AFFILIATED INSTITUTIONS**  
**ANNA UNIVERSITY, CHENNAI**  
**REGULATIONS - 2009**  
**CURRICULUM AND SYLLABUS I SEMESTER**  
**M.E. – INDUSTRIAL ENGINEERING**  
**SEMESTER – I**

<b>Course code</b>	<b>Course Title</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>					
MA9317	<u>Probability and Statistics</u>	3	0	0	3
IE 9311	<u>Production and Operations Management</u>	3	0	0	3
IE 9312	<u>Operations Research</u>	3	0	0	3
IE 9313	<u>Human Factors in Engineering and Design</u>	3	0	0	3
IE 9314	<u>Logistics and Supply Chain Management</u>	3	0	0	3
IE 9315	<u>Managerial Accounting and Finance</u>	3	0	0	3
<b>PRACTICALS</b>					
IE 9316	<u>Industrial Engineering Laboratory I</u>	0	0	3	2
IE 9317	Seminar I	0	0	2	1
<b>TOTAL CREDITS</b>					<b>21</b>





IE 9312

OPERATIONS RESEARCH

L T P C  
3 0 0 3

**UNIT I INTRODUCTION TO LINEAR PROGRAMMING 9**

Concepts and development of OR, assumptions, formulation, graphical method, Simplex Algorithm.

**UNIT II ADVANCED TOPICS IN LINEAR PROGRAMMING 9**

Revised simplex method, duality theory, sensitivity analysis, Introduction to Integer Programming.

**UNIT III NET WORK METHODS 9**

Transportation, assignment, maximum flow, shortest route, spanning tree problems, PERT/CPM.

**UNIT IV DYNAMIC PROGRAMMING 9**

Concepts, formulation, recursive approach, computation procedure.

**UNIT V WAITING LINE MODELS 9**

Queuing characteristics and terminology, single server and parallel server models, Introduction to Markov Process .

**TOTAL : 45 PERIODS**

**REFERENCES :**

1. Hamdy A.Taha, "Operations Research: an introduction", 4<sup>th</sup> edition, Mc Millan Co., 2003.
2. Don T.Phillips, A.Ravindran & James Solberg, Operations Research: Principles and practice, John Wiley & Sons, 1992.
3. Guisseppi A.Forgionne, Quantitative decision making, Wordsworth Publishing Co., 1986.
4. Schaum's Outline Series Operations Research II Edition, Richard Broson, Govindasamy Naachimuthu, 2000.
5. Hillier and Lieberman, " Introduction to Operations Research", McGraw Hill International Edition, Seventh Edition, 2001.

**IE9313**

**HUMAN FACTORS IN ENGINEERING AND DESIGN**

**L T P C**

**3 0 0 3**

**UNIT I INTRODUCTION 9**

Definition, human technological system, multidisciplinary engineering approach, human-machine system, manual, mechanical, automated system, human system reliability, conceptual design, advanced development, detailed design and development, human system modeling.

**UNIT II INFORMATION INPUT 9**

Input and processing, text, graphics, symbols, codes, visual display of dynamic information, auditory, tactual, olfactory displays, speech communications.

**UNIT III HUMAN OUTPUT AND CONTROL 9**

Physical work, manual material handling, motor skill, human control of systems, controls and data entry devices, hand tools and devices.

**UNIT IV WORKPLACE DESIGN 9**

Applied anthropometry, workspace design and seating, arrangement of components within a physical space, interpersonal aspects of work place design, design of repetitive task, design of manual handling task, work capacity, stress, fatigue.

**UNIT V BIOMECHANICS AND ENVIRONMENTAL CONDITIONS 9**

Biostatic mechanics, statics of rigid bodies, upper extremity of hand, lower extremity and foot, bending, lifting and carrying, biodynamic mechanics, human body kinematics, kinetics, impact and collision.

Illumination, climate, noise, motion, sound, vibration.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**

1. Chandler Allen Phillips, "Human Factors Engineering", John Wiley and Sons, New York, 2000.

**REFERENCES :**

1. Mark S Sanders, "Human Factors in Engineering and Design", McGraw Hill, New York, 1993.
2. Bridger R S, "Introduction to Ergonomics", Taylor and Francis, London, 2003.

**UNIT I INTRODUCTION****5**

Definition, decision phases in a supply chain, objectives of SCM, examples of supply chains, supply chain drivers, supply chain integration, supply chain performance measures.

**UNIT II NETWORK DESIGN IN SUPPLY CHAIN****10**

Role of distribution in supply chain – distribution network design – factors influencing distribution network design, distribution networks in practice – network design in the supply chain – factors influencing the network design, framework for network design, models for facility location and capacity allocation – Impact of uncertainty on network design.

**UNIT III INVENTORY MANAGEMENT IN SUPPLY CHAIN****10**

Cycle inventory – economies of scale to exploit fixed costs, quantity discounts, example problems – multi-echelon inventory – safety inventory in supply chain – safety level estimation, supply uncertainty, data aggregation, replenishment policies, managing safety inventory in practice – product availability – optimal level, affecting factors, supply chain contracts, examples. Push strategy, pull strategy-Kanban replenishment systems, types, implementation, push-pull strategy.

**UNIT IV STRATEGIC ALLIANCES ,CUSTOMER VALUE AND GLOBAL SUPPLY CHAINS****10**

Framework for strategic alliance - 3PL and 4PL – retailer-supplier partnerships – distribution integration – procurement and outsourcing –benefits, E-procurement – design for logistics – supplier integration into new product development – mass customization.

Customer value – dimensions, strategic pricing, measures, IT and customer value – global supply chain – introduction, driving factors, risks and advantages, issues, regional differences in logistics.

**UNIT V INFORMATION TECHNOLOGY IN SUPPLY CHAIN****10**

Goals – standardization – infrastructure – interface devices, communications, databases, system architecture – system components – integrating the supply chain information technology - DSS for supply chain management.

Value of information – Bullwhip effect, information and supply chain technology – customer relationship management, supplier relationship management.

**TOTAL : 45 PERIODS****TEXT BOOKS :**

1. Simchi – Levi Davi, Kaminsky Philip and Simchi-Levi Edith, “Designing and Managing the Supply Chain”, Tata McGraw –Hill Publishing Company Ltd, New Delhi, 2003.
2. Chopra S and Meindl P, “Supply Chain Management: Strategy, Planning, and Operation”, Second edition, Prentice Hall India Pvt. Ltd, New Delhi, 2005.

**REFERENCES :**

1. Robert B Handfield, And Ernest L Nichols, “Introduction to Supply Chain Management”, Prentice Hall, Inc, New Delhi, 1999.
2. Sahay B S, “Supply Chain Management”, Macmillan Company, 2000

3. David Brunt, And David Taylor, "Manufacturing Operations And Supply Chain Management : The Lean Approach", Vikas Publishing House , New Delhi, 2001
4. Hartmud Stadler, And Christoph Kilger, "Supply Chain Management And Advanced Planning: Concepts, Models, Software", Springer-Verlag, 2000
5. David F Ross, "Introduction To E-Supply Chain Management", CRC Press, 2003.

**IE 9315**

**MANAGERIAL ACCOUNTING AND FINANCE**

**L T P C  
3 0 0 3**

**UNIT I FINANCIAL MANAGEMENT**

**9**

Evolution, scope, objectives, functions, environment of corporate finance, Indian Financial system, Reserve Bank of India, Financial institutions, Financial markets, Merchant Banking Financial Services.

Long term - Retained earnings, equity, debenture, term loans, deferred credit, leasing, hire purchase; Short term - Accruals, trade-credit, short term bank finance, public deposit, commercial paper; Cost of capital, Leverage

**UNIT III FINANCIAL STATEMENTS AND ANALYSIS:**

**9**

Double entry book keeping, journal, subsidiary books, bank reconciliation statement, ledger, trialbalance, trading, profit and loss account, balance sheet; Financial statement analysis, types of financial ratios - liquidity, leverage, profitability, valuation ratios, time series analysis, common size analysis, Du-pont analysis.

**UNIT III COST ACCOUNTING AND CONTROL**

**9**

Budget - meaning, purpose, types of budgets- sales, production, purchasing, labour, cash; Flexible budgets.

Nature - Historical and future costs; Cost classification - labour, material, overhead; cost ladder, cost allocation, overhead absorption methods - DL, DM, number of pieces, LHR, MHR, Activity Based Costing; Accounting for service department expenses; Variance analysis for cost control - labour, material, overhead, variances, various types, illustrative problems.

**UNIT IV WORKING CAPITAL MANAGEMENT**

**9**

Overall considerations, influencing factors, working capital policy; Operating cycle analysis - procedure, problems; Cash management; Credit management - terms, credit-policy, credit-evaluation, control of accounts, receivable; Inventory Management - need, order quantity/point, pricing of raw material and valuation, monitoring and control of inventories.

## UNIT V CAPITAL STRUCTURE AND BUDGETING

9

Net income approach, Net operating income approach, Traditional position, Modigliani and Miller position; Planning the capital structure, EBIT - EPS analysis, ROI – ROE analysis, Assessment of dept capacity;

Process - cost/benefits, Investment appraisal criteria, time value of money, net present value, internal rate of return, profitability index, pay-back period, accounting rate of return, cash flows

**TOTAL: 45 PERIODS**

### TEXT BOOKS :

1. Prasanna Chandra, "Fundamentals of Financial Management", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2004.
2. Pandey I M "Management Accountng", Vikas Publishing House, 2000.

### REFERENCES :

1. Pandey I M, "Financial Management ", Tata McGraw Hill, 2003.
2. Van Horne, "Financial Management", McGraw Hill, 2002.
3. Ramachandra Aryasri A, Ramana Murthy V V, "Engineering Economics and Financial Management", Tata McGraw Hill, New Delhi, 2004.

IE 9316

INDUSTRIAL ENGINEERING LABORATORY-I

L T P C  
0 0 3 2

1. Solving linear programming using MS Excel and Optimization Package (TORA /LINDO)
2. Solving Transportation and Assignment problem using Optimization Package (TORA /LINDO)
3. Solving Maximal flow and Minimal spanning tree problem using Optimization Package (TORA /LINDO)
4. Solving PERT and CPM using Optimization Package (TORA /LINDO)

5. Forecasting using MS Excel
6. Capacity planning using MS Excel
7. Aggregate planning using MS Excel
8. Master production schedule using MS Excel
9. Materials requirement planning for a typical industry using MS Excel
10. Solving Inventory Control problems using MS Excel

**TOTAL: 45 PERIODS**