Detailed Syllabi for the M.Tech. Programme in

INDUSTRIAL ENGINEERING AND MANAGEMENT

Core Courses: First Semester

MEA601 DECISION MODELLING I

L	T	P	C
3	1	0	3

Module 1 (11 hours)

Introduction: Theory of Simplex Method, Duality Theory, Duality theorems, Dual simplex method, Revised simplex method, Bounded variables algorithm, Sensitivity analysis, Parametric programming.

Module 2 (8 hours)

Integer Programming: Cutting plane method, Branch and bound method.

Network Models and Solutions: Shortest Route problems, Minimal spanning tree problems, Maximal flow problems.

Complexity of algorithms: Complexity of algorithms for combinatorial optimization problems.

Module 3 (10 hours)

Non-linear Programming Problems: General non-linear programming problems; convex, quasi-convex, concave and unimodal functions, Theory of unconstrained optimization-Necessary and sufficient conditions for extrema, Theory of constrained optimization-Lagrange multipliers and Lagrangian optimization, Inequality constraints, Kuhn-Tucker conditions.

Module 4 (10 hours)

Algorithms for Unconstrained Optimization: Fibonacci search method, Golden section search method, Hooke and Jeeve's method, Newton-Raphson method, Cauchy's (Steepest descent) method.

Algorithms for Constrained Optimization: Penalty function methods, Quadratic programming, Separable convex programming.

References:

1. Hillier, F.S. and Liberman, G.J., Introduction to Operations Research, McGraw-Hill International edition, 2001.
2. Rao, S.S. Optimization: Theory and Applications, Second edition, Wiley eastern, 1994.
3. Ravindran, A., Philips, D.T., and Solberg, J.J., Operations Research: Principles and Practice, Second Edition, John Wiley & Sons, 1987.
4. Taha, H.A., Operations Research: An Introduction, Sixth Edition, Prentice-Hall of India, New Delhi, 1999.
5. Beighler, C., Philips, D., and Wild, D., Foundations of Optimization, Second Edition, Prentice-Hall, New Jersey, 1979.
6. Deb, K., Optimization in Engineering Design, Prentice-Hall of India, New Delhi, 1994.
7. Papadimitriou, C.H., and Steghtz, K., Combinatorial Optimization:Algorithms and Complexity, Prentice-Hall, New Jersey, 1982.
8. Simmons, D.M., Ravindran, A., Non-linear Programming for Operations Research, Prentice-Hall, New Jersey, 1975.
9. Reklatis, G.V., Ravindran, A., and Ragsdell, K.M., Engineering Optimization: Methods and applications, Wiley Interscience, New York, 1983.

*** L: Lecture; T: Tutorial; P: Practical; C: Credits**

MEA602 INVENTORY AND SUPPLY CHAIN MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 hours)

Introduction to Supply Chain Management (SCM): Concept of Logistics Management, Concept of supply management and SCM, Core competency, Value chain, Elements of supply chain efficiency, Flow in supply chains, Key issues in supply chain management, Decision phases in supply chain, Supply chain integration, Process view of a supply chain, Competitive Strategy and supply chain strategies, Uncertainties in supply chain, Supply chain drivers.

Module 2 (9 hours)

Sourcing and Procurement: Outsourcing benefit, Importance of suppliers, Evaluating a potential supplier, Supply contracts, Competitive bidding and Negotiation, E-procurement

Purchasing: Objectives, Relations with other departments, Centralised and Decentralised purchasing, Purchasing procedure, Types of orders, Tender buying, Purchasing department records, Computer based systems/EDI.

Stores Management: Functions, Storage methods, Receiving, Inspection, Issues, Inventory Valuation.

Module 3 (10 hours)

Introduction to Inventory Management: Selective Control Techniques, MUSIC-3D systems, Various costs.

Independent Demand Systems: Deterministic Models, Quantity Discounts - *all units, incremental price*; Sensitivity, Make-or-buy decisions.

Multi-item Joint Replenishment: Economic Production Quantity for multiple items.

Inventory System Constraints: Exchange Curve (Optimal Policy Curve), Working Capital restrictions, Storage Space restrictions.

Module 4 (10 hours)

Independent Demand Systems (Probabilistic Models):

Single order Quantities: Payoff Matrix, Expected Value Criterion, Lost sales case, Mathematical formulation of discrete and continuous cases.

Dynamic Order Quantities: Q- system, P- system, Mathematical modelling under known stock out costs and service levels,

Managing inventory in supply chain: Bullwhip effect, Information and supply chain trade-offs

References:

1. Chopra, S., and Meindl, P., Supply chain Management: Strategy, Planning and Operations. Second Edition, Pearson Education (Singapore) Pte. Ltd, 2004.
2. Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., Designing & Managing the Supply Chain: Concepts, Strategies & Case studies. Second Edition, Tata McGraw-Hill Edition, 2003.
3. Doebler, D.W. and Burt, D.N., Purchsing and Supply Chain Management: Text and Cases, McGraw-Hill Publishing Company Limited, New Delhi, 1996.

4. Tersine, R.J., Principles of Inventory and Materials Management, 4th edition, Prentice-Hall Inc., New Jersey, 1994.
5. Christopher, M., Logistics and Supply Chain Management, Pitman Publishing Company, London, 1993.
5. Narasimhan, S.L., McLeavey, D.W. and Billington, P.J., Production Planning and Inventory Control, 2nd edition, Prentice-Hall India, New Delhi, 1995.
6. Starr, M.K. and Miller, D.W., Inventory Control : Theory and Practice, Prentice-Hall India, New Delhi, 1986.
7. Raghuram, G. and Rangaraj, N., Logistics and Supply Chain Management: Cases and Concepts, Macmillan India Limited, New Delhi, 2000.

MEA603 COST MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Cost Management Concepts: Concepts of cost – cost management and value chain – cost behavior and CVP relationships – cost functions – methods of measuring cost functions – Applications.

Module 2 (12 Hours)
Product Costing Systems: Concepts – Job costing, process costing – variable and absorption costing – standard costing, variance analysis, Kaizen costing.

Module 3 (8 Hours)
Activity Based Cost Management System: ABC system, activity cost drivers, Activity Based Management.

Module 4 (9 Hours)
Cost Management and Decision Making- Production decisions – pricing and product planning – Applications.

References:

1. Horngreen " Cost Accounting – A Managerial emphasis" 11/e Pearson Education, Asia, 2002.
2. Horngreen "Introduction to management Accounting" 11/e, Pearson Education, Asia, 2002.
3. Hilton et.al. "Cost Management – strategies for business decisions" 2/e, Tata McGraw Hill, 2003.
4. Khan and Jain "Management and Cost Accounting" 2/e, Tata McGraw Hill Delhi 2001.
5. Hilton "Managerial Accounting", 5/e, Tata McGraw Hill, Delhi 2002.
6. Ravi M Kishore "Cost and Management Accounting" Taxman Publishers Delhi 2001.

MEA604 MARKETING MANAGEMENT

L	T	P	C
3	1	0	3

Module 1: (9 hours)
Introduction to Marketing: Marketing defined, Marketing Concepts, Marketing functions, Marketing Environment.
Marketing Planning: Planning Process, Strategic Business Units, Evaluation of SBUs.

Module 2: (10 hours)
Market Segmentation and Market Targeting: Segmentation Procedure, Market Targeting, Product Positioning.
Marketing Mix: Marketing mix variables and their importance.
Pricing Strategies: Meaning of pricing, Importance, Objectives, Factors influencing price determination, Demand market based pricing, Tender pricing, Product line pricing, Selecting the final price.

Module 3: (10 hours)
Marketing Research: Marketing Research Process, Research objectives, Research Plan development, Collecting information, Analysis.
Consumer Behaviour: Factors influencing Consumer Behaviour, Decision making process in buying, Perceived risks.
Product Development: Idea generation, Concept development and Testing, Market Testing, Commercialization.

Module 4: (10 hours)
Marketing Communication: Marketing mix variables communicate, Steps in developing effective communication.
Advertising Management: Purpose, Factors in advertising, Advertising Portfolio Selection, Deciding message or copy.
Sales Promotion: Sales Promotion Tools, Consumer promotion tools, Business promotion tolls.

References:

1. Kotler, P., Marketing Management - Analysis, Planning, Implementation and Control, Prentice-Hall of India, New Delhi, 2001.
2. Ramaswamy, V.S. and Namkumari, S., Marketing Management - Planning, Implementation and Control, Macmillan India Limited, 1990.
3. Majumdar, R., Marketing Research - Text, Applications and Case Studies, New Age International (P) Limited Publishers, New Delhi, 1996.
4. Stanton, W.J., Etzel, M.J. and Walker, B.J., Fundamentals of Marketing, McGraw-Hill International Edition, 1991.
5. Mathew, M.J., Sales Management and Sales Promotion, First Edition, RBSA Publishers, 1994.

MEA691 INDUSTRIAL ENGINEERING LABORATORY

L	T	P	C
0	0	3	2

- Experiments on Method Study
- Experiments on Time Study
- Vocational Guidance Tests
- Muscle Dynamometer Tests
- Eye-Hand Coordination Experiments
- Depth Perception Tests
- Visual Acuity Tests
- Construction of Control Charts for Quality Planning and Analysis

MEA692 SEMINAR

L	T	P	C
0	0	3	1

Each student shall prepare a seminar paper on any topic of interest related to the core/elective courses being undergone in the first semester of the M. Tech. programme. He/she shall get the paper approved by the Programme Coordinator/Faculty Members in the concerned area of specialization and shall present it in the class in the presence of Faculty in-charge of seminar class. Every student shall participate in the seminar. Grade will be awarded on the basis of the student's paper, presentation and his/her participation in the seminar.

Core Courses: Second Semester

MEA611 DECISION MODELLING II

L	T	P	C
3	1	0	3

Module 1 (11 Hours)

Introduction to Decision Making: Decision analysis, Decisions under risk, Decision trees – Decision analysis with experimentation, Utility theory, Decisions under uncertainty.

Multi-objective Decision Models: Introduction to multi-objective decision making, Concept of pareto-optimality, Goal programming formulation, The weighting method of solution, Analytic hierarchy process.

Module 2 (9 Hours)

Sequential Decision Making (Deterministic Case): Sequential decision models, Dynamic programming, Bellman's principle of optimality, Forward recursion and backward recursion, Discrete state discrete time case, Continuous state continuous time case.

Module 3 (10 Hours)

Sequential Decision Making (Stochastic Case): Stochastic processes, Markov processes, Markov chains, Markov decision problems, Algorithms for solving Markov decision problems, finite-stage models, infinite stage models.

Module 4 (9 Hours)

Queuing Models for Decision Making: Application of queuing models, Features of queuing process, Characterisation of queuing models and solutions - (M/M/1): (GD/), (M/M/c): (GD/), (M/M/1): (GD/N) models.

References:

1. Budnick F.S., McLeavey and R. Mojena, Principles of Operations Research for Management, 2/e, Richard D. Irwin Inc., Homewood, Illinois, 1991.
2. Taha H.A., Operations Research: An Introduction, 4/e, Maxwell Macmillan International Edition, 1989.
3. Hillier, F.S., and Liberman, G.J., Introduction to Operations Research, McGraw-Hill International Edition, 2001.
4. Rao, S.S. Optimization: Theory and Applications, Second edition, Wiley eastern, 1994.
5. Ravindran, A., Philips, D.T., and Solberg, J.J., Operations Research: Principles and Practice, Second Edition, John Wiley & Sons, 1987.
6. Puterman M.L., Markov Decision Processes, Wiley Intersciences, New York, 1994.
7. Steur R.E., Multiple Criteria Optimizations: Theory, Computation and Application, John Wiley & Sons, 1986.
8. Bellman R.E. and Dreyfus S.E., Applied Dynamic Programming, Princeton University Press, Princeton, New Jersey, 1962.
9. Bertsekas D.P., Dynamic Programming: Deterministic and Stochastic Models, Prentice Hall Inc., Englewood Cliffs, New Jersey, 1987.

MEA612 PRODUCTION PLANNING AND CONTROL

L	T	P	C
3	1	0	3

Module 1 (9 Hours)

Manufacturing Planning and Control (MPC): MPC systems, MPC system payoff, Hierarchy of managerial decisions, MPC system framework, Type of configurations manufacturing system, Options in dealing with the hierarchy of decisions.

Enterprise Resource Planning (ERP): What is ERP, ERP and functional units, How MPC fits within ERP, Performance measures.

Module 2 (10 Hours)

Demand Management: Demand management and MPC environment, Communicating with other MPC modules and customers, Forecasting framework; Time series analysis - Individual-item, short-term forecasting models, Forecast errors, Forecast error over lead time, Interval estimate, Special classes of individual items; Coefficient of correlation.

Module 3 (10 Hours)

Sales and Operation Planning: Nature of sales and operation planning, Relevant costs, Sales and operation planning methods.

Master Production Schedule (MPS): Nature of MPS, MPS Techniques, Time fencing and MPS stability, Structuring BOM, Final assembly schedule, Managing the MPS, Disaggregation techniques.

Module 4 (10 Hours)

Material Requirement Planning (MRP): Nature of MRP, MRP records, MRP logic, Technical Issues, Using the MRP system, System Dynamics, Lot sizing methods, Buffering concepts, System nervousness.

Production Activity Control: Framework, Shop floor control concepts, Techniques, Performance measures, Gantt chart, Finite loading systems, Priority sequencing rules, General job shop scheduling - Static, deterministic job shop - Dynamic, probabilistic job shop.

References:

1. Thomas E. Vollmann, William L. Berry, D Clay Whybark, and F. Robert Jacobs, Manufacturing Planning and Control for Supply Chain Management, Fifth Edition, Mc Graw Hill, International Edition. 2005.
2. Edward A. Silver, David F. Pyke and Rein Peterson, Inventory Management and Production Planning and Scheduling, Third Edition, John Wiley & Sons, 1998.
3. Seetharama L. Narasimhan, Dennis W. McLeavy and Peter J. Billington, Production Planning and Inventory Control, Second Edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2000.
4. Richard J. Tersine, Production/Operations Management, Second Edition, North Holland, 1985.
5. A. C. Hax and D. Candea, Production and Inventory Management, Prentice-Hall, Englewood Cliffs, NJ, 1984.

MEA613 FINANCIAL MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Introduction to financial management and valuation of financial assets: - corporate finance, goal of financial management, FM decisions, financial statements – working with financial statements, ratio analysis, fund flow analysis, time value of money, stock valuation, bond valuation.

Module 2 (10 Hours)
Investment in long term assets:- capital budgeting decision criteria, traditional techniques, discounted casts flow techniques, NPV – IRR comparisons, capital rationing, risk analysis.

Module 3 (10 Hours)
Cost of capital and long term financial policy:- Raising capital, cost of capital, financial and operating leverage, capital structure theories, dividends and dividend policy, introduction to CAPM.

Module 4 (9 Hours)
Special topics: - Short-term financial planning – working capital – planning and management.
Leasing – meaning – evaluation as an alternative source of financing.
International corporate finance: - foreign exchange, exchange rate, interest rate parity – international financing, futures and options in corporate finance.

References:

1. VanHorne, " Financial Management and policy", 12/e, PHI, (2002).
2. Breally and Myers, "Principles of corporate Finance", 7/e, TMH, (2002).
3. Ross, Westerfield and Jordan, "Fundamentals of corporate Finance", 6/e, TMH, (2002).
4. Damodaran, "Corporate Finance", John Wiley & Sons, (2002).

MEA614 FACILITIES LAYOUT PLANNING

L	T	P	C
3	1	0	3

Module 1: (10 hours)

Introduction: Types of manufacturing processes, Overview of Plant Design, Plant Location - *Location Factors, Location Theory,* Nature, Significance and Scope of Facilities Layout Planning.

Plant Layout: Need for Layout, Objectives, Types of Layout, Layout Design Process, Layout Design Cycle, Data Collection, Equipment Requirement, Activity Analysis, REL Diagram, Employee Requirement, Development of Layout - Block Plan, Selection, Specification, Evaluation.

Module 2: (10 hours)

Single Facility Location Problems: Rectilinear Distance Problems, Squared Euclidean Distance Problems and Euclidean Distance Problems, Contour Lines (Iso-Cost Lines).

Introduction to Multifacility Location Problems: Formulation of Problems, LP formulation with rectilinear distance.

Module 3: (10 hours)

Computerised Layout Planning: Basic Philosophy in Computerised Layout Planning, Construction and Improvement Algorithms, Major features of Improvement Algorithms.

Major Features of Computerised Algorithms, such as ALDEP, CORELAP, CRAFT, FRAT, and MAT.

Formulation of Layout Problems: Quantitative, Qualitative, and multi-objective, Limitation of Computerised Layout Planning, Flow Dominance, Complexity Rating, Solution Efficiency.

Module 4: (9 hours)

Mass Production Management (Line Balancing): Basic idea of assembly line balancing, Optimization of number of stations with given production rate, Minimization of cycle time with fixed number of stations.

Line Balancing Algorithms: Kilbridge and Wester, Rank Positional Weight method, COMSOAL, Moodie and Young method.

References:

1. Francis, R.L. and White, J.A., Facility Layout and Location: An Analytical Approach, Prentice-Hall Inc., New Jersey, 1974.
2. Moore, J.M., Plant Layout and Design, Macmillan Company, New York, 1970.
3. Wild, R., Mass Production Management, John Wiley and Sons, New York.
4. Apple, J.M., Plant Layout and Material Handling, John Wiley and Sons, New York.
5. Tompkins and White, Facilities Planning, John Wiley and Sons, New York.

MEA693 COMPUTATIONAL LABORATORY

L	T	P	C
0	0	3	1

Development of algorithms and computer programs using C, C++, MATLAB, LINDO, LINGO, EXCEL and ARENA for the modeling and analysis of decision problems in the following areas:

- Production Planning and Control
- Inventory and Supply Chain Management
- Manufacturing System Design
- Performance of Manufacturing Systems
- Facilities Planning
- Financial Management
- Human Resource Management
- Marketing Management

MEA694 SEMINAR

L	T	P	C
0	0	3	1

Each student shall prepare a seminar paper on any topic of interest related to the core/elective courses being undergone in the second semester of the M. Tech. programme. He/she shall get the paper approved by the Programme Coordinator/Faculty Members in the concerned area of specialization and shall present it in the class in the presence of Faculty in-charge of seminar class. Every student shall participate in the seminar. Grade will be awarded on the basis of the student's paper, presentation and his/her participation in the seminar.

Elective Courses:

MEA621 STATISTICS FOR MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 hours)

Data Description: Graphical presentation of data - Numerical description of data - Exploratory data analysis.

Probability distributions:- Introduction to probability and random variables - Binomial distribution, Poisson distribution, Geometric distribution, Hyper Geometric distribution, Normal distribution, Log-Normal distribution, Uniform distribution, Exponential distribution, Gamma distribution, Beta distribution and Weibull distribution - Random samples and sampling distributions of mean and variance.

Module 2 (10 hours)

Parameter Estimation: Point estimation - Properties of estimators, The method of maximum likelihood, The method of moments, Confidence interval estimation of mean, and variance.

Statistical hypothesis tests: Operations characteristic curve, Tests of hypothesis on the mean of a Normal Distribution, Tests of hypothesis on the means of two Normal distributions, The paired t-test, Tests of hypothesis on one variance, Tests of hypothesis for the equality of two variances, The testing for goodness of fit.

Module 3 (11 hours)

Design and Analysis of Experiments:- Fundamental assumptions of analysis of variance, Single factor experiments – Fixed/random effects model – Model adequacy checking - Multiple comparisons - Design of experiments with several factors - Two factor factorial experiments - General factorial experiments - The 2^k Factorial design –Introduction to response surface method in optimal design of parameters.

Module 4 (8 hours)

Non-Parametric Statistics: The sign test - The wilcoxson signed rank test, The Wilcoxson Rank-sum test.

Taguchi Approach to Design of Experiments - The Loss Function – Orthogonal array – Signal-to-Noise ratio.

References:

1. Garcia-Diaz, A and Phillips, D. T., Principles of Experimental Design and Analysis, Chapman & Hall, New York, 1995.
2. Hines, W. W, and Montgomery, D. C., "Probability and Statistics in Engineering and Management Science", John Wiley and Sons, New York, 1990.
3. Freund, J. E. Mathematical Statistics", Prentice Hall of India, New Delhi, 1990.
4. Hicks C.R. and Turner, K.V., Fundamental Concepts in the Design of Experiments, Fifth Edition, Oxford University Press, 1999.
5. Anderson, M.J. and Whitcomb, P.J., DOE Simplified: Practical Tools for Effective Experimentation, Productivity Press, 2000.
6. Levin, R.I. and Rubin, Statistics for Management, Seventh Edition, Prentice Hall International edition, 1997.

MEA622 WORK SYSTEM DESIGN

L	T	P	C
3	1	0	3

Module 1 (13 Hours)

Definition and scope of work design and measurement.

Work Design and Methods Study: Scope of work design – procedure for methods study – Process analysis – Process charts – Operation analysis – Principles of motion economy.

Work Measurement: Time study equipment – Establishment and maintenance of time standards – Allowances and Performance rating - Precision time measurement – Pre-determined fundamental motion time standards – Standard data – Work sampling – activity and performance sampling – Errors and sensitivity of technique – Physiological methods of work measurement.

Module 2 (10 Hours)

Ergonomics: Nature of man-machine systems – characteristics – purpose – operational functions and components – types of systems.

Information input and processing – sources and pathways of stimuli-Information theory – Information theory – Information input processes – Displays used in information input – Coding systems – Time sharing – Noise and the theory of signal detection – Human information processing.

Module 3 (8 Hours)

Visual displays – visual acuity and its types – Quantitative and qualitative displays – Visual codes, symbols and signs – General guidelines in design of visual displays.

Auditory and tactual displays – Masking – Types of auditory displays – cutaneous senses – Tactual displays.

Speech communication – Speech intelligibility – Components of speech communication.

Module 4 (8 Hours)

Nature of human activity and their effects – Bases of human motor activity – Bio mechanics of motion – Energy expenditure – Strength and endurance – Speed and accuracy of movements.

Human control of systems – Input-output channels – Compatibility – Nature of continuous control systems – Influence of display factors and control factors on system control.

References:

1. Barnes, R. M., Work Design and Measurement, Wiley & Sons.
2. Macormick, E.J., Human Factors in Engineering and Design, Tata McGraw-Hill.

MEA623 MANAGEMENT OF TECHNOLOGY AND INNOVATION

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Understanding Management of Technology, Key concepts – importance – issues. Process of technological change – innovation technology evaluation, Diffusion.

Module 2 (10 Hours)

Technology and competition, technology acquisition. Integration of strategic planning and technology planning. Key performance factors for technology management.

Module 3 (10 Hours)

Technology Strategy: - Technology intelligence – collaborative mode, Appropriation of technology – Deployment in new products, simultaneous engineering, Development in the value chain.

Module 4 (9 Hours)

Technology evaluation and financing – changing role of R & D, Management of manufacturing technology – corporate cultures – technology audits.

References:

1. Babcock D.L. "Managing Engineering Technology" Prentice Hall.
2. Burgelman et.al "Strategic Management of Technology and Innovation" Tata McGraw Hill (2001).
3. Cleland and Bursic "Strategic Technology management" Amacom, Newyork.
4. Narayanan U.K. "Managing Technology and Innovation for competitive Advantage" Pearson Education, Asia 2001.
5. Betz F "Managing Technology – competing Through New Ventures, Innovation and Corporate Research." Prentice Hall.

MEA624 STRATEGIC MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Basic Concepts: Concept of strategic management – social and other responsibility, Enviornmental scanning and Industry analysis – organisational analysis – mission and objectives.

Module 2 (10 Hours)
Strategy formulation: SWOT, alternative strategies – competitive strategies – Portfolio analysis – Functional Strategy.

Module 3 (10 Hours)
Strategy Implementation and Control: Implementation issues – analysis change, analysing culture, implementation approach, evaluation and control.

Module 4 (9 Hours)
Strategic issues of technology, entrepreneurial ventures, non-profit organisations.

References:

1. Certo and Peter "Strategic Management - A focus on process," Tata McGraw Hill (1990).
2. Pearce and Robinson "Strategic Management, formulation, implementation and control" 7/e, McGraw Hill (2000).
3. Wheelen "Concepts of Strategic Management and Business Policy 8/e, Pearson Education (2002).
4. David "Strategic Management" Pearson Education (2002).

MEA625 MANAGEMENT INFORMATION SYSTEMS

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Information systems for Decision Making: Building blocks in information systems-input, output, model, technology, database, and control blocks, System view of business and information system design forces, Information systems development life cycle, Information systems for strategic planning.

Module 2 (10 Hours)

General Steps in Information System Design: System Investigation and requirements engineering, System requirements specification documents, Feasibility studies, System analysis and general system design, Charting tools in data base design, Data flow diagrams and E-R diagrams, Decision tools and models, Prototyping, Detailed system design, Form design, Code design, Database normalisation, Introduction to data structures and relational database.

Module 3 (10 Hours)

System Implementation: Modern software design techniques, Verification and validation methods, Performance of software systems, Software metric and models, Software standards, Introduction to Capability Maturity Model(CMM) and Quality Management in software organizations.

System Testing: Software testing, Review, walkthrough and inspection, Testing approaches, Software reliability, Errors, faults, repair and availability, Reliability and maintenance.

Module 4 (9 Hours)

System Evaluation: System implementation issues and solution procedures, training and post implementation audit, System fine-tuning, Monitoring and updating.

Modern Information Systems: Multimedia technology, Distributed data management, Data mining and warehousing, Security features in global information systems.

References:

1. Burch and Gruditski, Information Systems-Theory and Practice, Fifth edition, John Wiley & Sons, New York, 1989.
2. Hawryszkiewycz, I.T., Introduction to Systems Analysis and Design, Prentice Hall of India, 1989.
3. Ian Sommerville, Software Engineering, 6th. Edition, Pearson Education Asia, 2001.
4. Lucas, Henry C., Analysis, Design, and Implementation of Information Systems, 4th Edition, McGraw Hill, New York, 1992.
5. O'Brien J.A., Management Information Systems, 4/e, Tata McGraw Hill, 1999.

MEA626 GROUP TECHNOLOGY AND FMS

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Introduction: World class manufacturing, Ways of configuring manufacturing system

Group Technology (GT): Role of GT in Computer Aided Manufacturing (CAM), Features of GT, Cellular manufacturing, Role of similarity in GT, Composite part, Coding and classification, Similarity coefficient based clustering, Key machine approach, Binary ordering algorithm, Production flow analysis.

Module 2 (10 Hours)

Models for Cellular Manufacturing System (CMS) Design: CMS design factors, Mathematical programming approaches, Model for dynamic part population, Solution procedure using genetic algorithm.

Module 3 (10 Hours)

Cellular Manufacturing: Focused factory and Pull production, Building blocks of workcell, Linked cell, Different type of cells, Cycle time, Workcell Design; Worker assignment; Incentive plans; Issues in implementing Cellular Manufacturing.

Process Planning: Process planning for parts and assemblies – Manual process planning; Computer aided process planning (CAPP); Approaches to process planning; Process Planning systems; Variant process planning– Development stages – Family formation – search algorithm.

Module 4 (9 Hours)

Flexible Manufacturing System (FMS): Types of automation, Flexibility, Types of FMS, FMS Layout configuration, Automated workpiece flow, Material handling, and machining, Performance measures – Bottleneck model – Extended bottleneck model – Sizing of FMS; FMS Scheduling and Control.

References:

1. John Nicholas (1998). Competitive Manufacturing Management - Continuous Improvement, Lean Production, and Customer-Focused Qualities, McGraw-Hill International Editions.
2. Sing, N., and Rajamani, D., (1996), Cellular Manufacturing Systems: Design, Planning & Control, First Edition, Chapman & Hall.
3. Askin, R. G., and Standridge, C. R., (1993), Modelling and Analysis of Manufacturing Systems, John Wiley & sons. Inc.
4. Mikell P. Groover (2001). Automation, Production Systems, and Computer-Integrated Manufacturing, Second Edition, Prentice Hall of India Private Limited.
5. David D. Bedworth, Mark R. Henderson, and Philip M. Wolfe (1991). Computer-Integrated Design and Manufacturing, McGraw-Hill International Editions.
6. Tien-Chien Cheng, Richard A. Wysk, and Hsu-Pin Wang (1998). Computer-Aided Manufacturing, Second Edition, Prentice Hall International, Inc.
7. Wicks, E. M., and Reasor, R. J., (1999), Designing Cellular Manufacturing systems with dynamic part population, IIE Transactions, Vol. 31, pp 11-20.
8. Burbidge, J. L., (1991), Production Flow Analysis for Planning Group Technology, Journal of Operation Management, Vol. 10, No. 1 (January), pp 5-27.

MEA627 RELIABILITY ENGINEERING AND MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Basic Concepts of Reliability: Definitions-Reliability, Hazard rate, Active Redundancy, Maintainability, Downtime; Reliability and Quality, Failure and failure modes, Causes of failures, Maintainability and Availability.

Reliability Mathematics: Introduction to probability distributions, Concept of Bathtub Hazard Rate curve, Reliability Evaluation of two-state device networks-series, parallel, k-out-of-m systems; Standby redundant systems, Reliability evaluation of three-state device networks-series and parallel.

Module 2 (10 Hours)

Reliability Determination Methods: Network reduction technique, Path tracing technique, Decomposition technique, Delta-Star method.

Advanced Reliability Evaluation Concepts: Supplementary variables technique, Interference theory, Human reliability, Common cauae failures, Fault trees, Failure mode and effect analysis .

Reliability Optimization: Redundancy optimization-parallel, series-parallel, and series networks.

Module 3 (10 Hours)

Failure Data Analysis: Failure data banks, Nonrepairable items failure data analysis-complete data, incomplete data; Incomplete failure data hazard plotting technique, Maximum likelihood estimation technique.

Total Productivity Maintenance (TPM): Distinctive features of TPM, Basic philosophy of zero defects (ZD), ZD and TPM, Maximizing equipment effectiveness, Six major losses, TPM development activities, Steps of TPM development, Autonomous maintenance, Planned maintenance, Measuring TPM effectiveness.

Module 4 (9 Hours)

Maintainability and Availability Concepts: Maintainability function, Availability function, Frequency of failures, Two-unit parallel system with repair, k-out-of-m systems, Preventive maintenance.

Reliability Management: Reliability Programme, Management policies and decisions, Reliability management by objectives, Reliability groups, Reliability data acquisition and analysis, Managing people for reliability.

References:

1. Balagrusamy, E., Reliability Engineering, Tata-McGraw Hill Publishing Company Limited, New Delhi, 1984.
2. Balbir S, Dhillon, Reliability Engineering in System Design and Operation, Von Nostrand Reinhold Company, New York, 1983.
3. Nakajima Seiichi, Introduction to TPM, Productivity Press India (P) Madras, 1997.
4. Lewis, E.E., Introduction to Reliability Engineering, John Wiley & Sons, New York, 1987.
5. O'Connor Patric D.T., Practical Reliability Engineering, 3/e revised, John Wiley & Sons, 1995.
6. Stamatis D.H., Failure Mode and Effect Analysis, Productivity Press India (P) Madras, 1997.

MEA628 PRODUCT MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Product Management – Introduction – role of product managers – product policy, product market, market potential, product market planning and demand forecasting - product life cycle – product portfolio analysis.

Module 2 (10 Hours)
Target marketing – segmentation – product differentiation, product positioning – product recall/deletion – managing product line.

Module 3 (10 Hours)
New product innovation and development – stages, adoption process – diffusion – product pricing – new product launch, strategies.

Module 4 (9 Hours)
Brand Management – concept – naming – brand equity – brand extension – brand positioning – product packaging.

References:

1. Chunawalla, "Product Management" Himalaya publishing House (2002).
2. Majumdar, "Product Management" Prentice Hall of India.
3. Lehmann & Winer "Product Management" Tata McGraw Hill (2002).
4. Merle Crawford "New Product Management" Tata McGraw Hill (2002).

MEA629 PROJECT MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Project Planning: Analysis and Appraisal Generation of project ideas, Scouting for project ideas, Preliminary screening, Project rating index, Cost of project.

Investment Appraisal: Social cost benefit analysis, UNIDO approach, Net benefit in terms of economic prices, Measurement of impact on distribution, Savings impact and its value, Income distribution impact, Adjustment for merit and demerit, Goods Little Mirrless approach, Shadow prices.

Module 2 (10 Hours)

Project Implementation: Development of project network, Dummy activities, Activity on node networks, Cyclic network, Forward pass and Backward pass computations, Algorithm for critical path, Total slacks, free slacks and their interpretations.

Time-cost Trade off Procedure: Schedule related project costs, Time cost trade off, Lowest cost schedule.

PERT Network: Three time estimates for activities, Estimation of mean and variance of activity times, Event oriented algorithm for critical path, Probability of meeting a schedule date.

Module 3 (10 Hours)

Network Analysis: Algorithms for shortest route problems-Dijkstra's, Flyod's, Pollacks, and Dantzig's algorithms; Algorithms for minimal spanning tree- Kruskal's algorithm and Prim's algorithm; Algorithms for maximal flow problems-Ford and Fulkerson's algorithm(Labelling method), Maximum flow minimum cut explanation.

Linear Programming Formulation of Network Problems: A flow network interpretation for determination of critical paths, Time cost trade off and maximal flow, Chance constrained linear programming for probabilistic durations of activities in PERT network.

Module 4 (9 Hours)

Project Scheduling with Limited Resources: Complexity of project scheduling with limited resources, Levelling the demands on key resources, A simple heuristic program for resource allocation.

Project Review and Administrative Aspects: Initial review, Performance evaluation, Abandonment analysis, Project organization, Matrix organization, Project control, Variance analysis approach, Performance analysis.

References:

1. Jerome D. Weist and Ferdinand K. Levy, A Management Guide to PERT/CPM, Prentice Hall of India, New Delhi, 1994.
2. Prasanna Chandra, Projects Planning, Implementation and Control, Tata McGraw Hill Publishing Company Limited, New Delhi, 1995.
3. Ravindran A., Phillips D.T., and Solberg J.J., Operations Research: Principles and Practice, 2nd edition, John Wiley & Sons, 1987.
4. Moder J.V. and Phillips C.R.E., Project Management with CPM and PERT, Van Nostrand Reinhold Company, 1964.

MEA630 TECHNICAL ENTREPRENEURSHIP

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Introduction: Basis and challenges of entrepreneurship, Technological entrepreneurship, Innovation and entrepreneurship in technology based organizations, High Tech. Entrepreneurship, Role of technical entrepreneurs in Industrial Development, Entrepreneurial characteristics, Entrepreneurship Index and its need.

Module 2 (10 Hours)

New Ventures: Concept of new ventures, Technology absorption, Appropriate technology, Networking with industries and institutions, Medium and small ventures, Product design for Rural entrepreneurs, Management concern in small and medium Enterprises.

Module 3 (10 Hours)

Starting a New Technological Venture and Developing the Business: Business idea, Business plan, Marketing plan, Financial plan, Organizational plan, Financing a new venture-Sources of capital, Venture capital, Going Public.

Module 4 (9 Hours)

Managing the New Technological Venture: Developing systems in new venture, managing during early operations, growth and expansion, ending the venture, Legal issues, Franchising or acquisition, Intrapreneurship, International Entrepreneurship.

References:

1. Gautam, Vinayshil (Ed.), Technical Entrepreneurship, Global Business Press, New Delhi, 1992.

2. Hisrich R.D., and Peters M.P., Entrepreneurship: Strategy, Developing, and Managing a New Enterprise, Irwin, Chicago, 1995.

3. Roberts E.B., Entrepreneurs in High Tech- Lessons from MIT and beyond, Oxford University Press, New York, 1991.

4. Timmons J., New Venture Creation: Entrepreneurship in the 1990's, Irwin, 1998.

5. Dollinger M.J., Entrepreneurship: Strategies and Resources, Irwin, Illionis, 1995.

6.. Patel V.G., Entrepreneurship Developing Programme in India and its Relevance to Developing Countries, EDI, Ahmedabad, 1987.

MEA631 BUSINESS ETHICS

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Basic Theory: Some basic principles-Meaning, Types of evil and consequences, Proportionality,Minor evils or Physical evils, Problems, Positive obligations, Rights, Cooperation in Evil, Location of responsibility, The gray areas, Economical and Political Considerations, Relationship between firm and employee, customers, competitors, intermediaries, and unions.

Module 2 (10 Hours)
Historical perspective, culture and ethics in India, codes and culture, Economics and the environment- green business, ethics and competition, The ethical code, social audit, A framework for analysis and action, The sphere of personal ethics- consequences, rights and duties, virtue and character, Role of objectivity, practicability, Judgement and balancing acts, The individual and corporation.

Module 3 (10 Hours)
Ethical Responsibilities of Economic Agents: role obligations, obligation to shareholder, rights and obligations to customer, obligation to pay taxes, Environmental protection, Corporate accountability, Ethical conflicts, Ethics, Government policies and laws.

Module 4 (9 Hours)
Ethical responsibilities of Organizational Leader: power, leadership, obstacles to ethical conduct, pressures for conformity, Evaluation and rewards, Job pressures and issues, organizational change, Ethics in use of Information Technology, Intellectual Property Rights, Ethics in Marketing, Ethics of advertising and sponsorship, Acquisition and merger, Multinational decision making-Reconciling International norms.

References:

1. Badaracco Jr J.L., Business Ethics: Roles and Responsibilities, Irwin, Chicago, 1995.
2. Drummond J., and Bain B.(Ed.), Managing Business Ethics, Butterworth Heinemann, Oxford, 1994.
3. Garrett M.Thomas, Business Ethics, The Times of India Press, Bombay,1970.
4. Mathias T.A.(Ed.), Corporate Ethics, Allied Publishers Ltd., New Delhi, 1994.
5. Hendry J., and Sorell T., Business Ethics, Butterworth Heinemann, Oxford, 1994.

MEA632 COMPUTER METHODS IN MANAGEMENT

L	T	P	C
3	1	0	3

Module I (10 hours)

Programming and Problem Solving: Computer organisation, Steps involved in computer programming, Developing algorithms and flow charts, Efficiency of algorithms, Program design methods, Top-down modular programming, Measures of program performance. Introduction to object oriented programming: Basic concepts of OOP, Object-oriented languages, Applications of OOP, Moving from C to C++.

Module II (10 hours)

Fundamentals of Programming: Variables and Arithmetic statements, Arrays, Functions, Data types, Flow of control, Functions, Recursion, Pointers and strings, Bitwise operators and enumeration types, Structures and unions, Linear linked lists and list operations, Basic I/O functions.

Module III (10 hours)

Unix system Interface: File descriptors, Pointers and strings, Bit-wise operators and enumeration types, Structures and unions, Linear linked lists and list operations, Basic I/O functions.

Introduction to Data structures: Operations on binary trees, storage representation and manipulation of binary trees, conversion of General trees in to binary trees, Dynamic storage management, sorting – bubble sort, tree sort, Searching – sequential and binary searching, hashing functions.

Module IV (9 hours)

Computer applications in business: Framework of E-commerce, LAN, WAN, Internet – HTTP, HTML, VRML, site security – firewalls, Transaction security, cryptography and cryptographic algorithms, Digital signatures

References

1. Kelley, A and Pohl, I , A Book on C, 4/e, Pearson Education, 2001.
2. Kamthene, A. N., Programming with ANSI and Turbo C, Pearson Education, 2002.
3. Kernighan B.W. & Ritchie D.M., C Programming Language, Prentice Hall of India.
4. Tremblay J.P.& Sorenson P.G., An Introduction to Data Structures with Applications, Mcgraw-hill International editions.
5. Bhasker B., Electronic Commerce, Tata McGraw-Hill companies, 2 ed.

MEA633 ORGANISATIONAL BEHAVIOR

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Introduction to Organizational Behaviour (OB): - Development and challenges, assumptions of contemporary OB. Foundations of individual behavior values – attitudes – personality – emotions – perception – abilities – motivation in organisations – work related attitudes.

Module 2 (10 Hours)
Group Process: Foundations of group behavior, understanding team, communication, leadership, power, conflict and negotiation.

Module 3 (10 Hours)
Organisational Process: Work design and technology, organisation structure and design – organisational culture.

Module 4 (9 Hours)
Special topics: Organisational change, stress management, decision making in organisations.

References:

1. Robbins, "Organisational Behavior", 9/e, Pearson Education, (2002).
2. Greenberg and Baron, "Behavior in Organisations", 7/e, Pearson Education, (2002).
3. Machane and Vonglinow, "Organisational Behavior", 2/e, TMH, (2003).
4. Hersey, Balaschard and Johnson, "Management of Organisational Behavior", 8/e, Pearson Education, (2002).

MEA634 CONSUMER BEHAVIOR

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Introduction: - Diversity in the market place, market segmentation, Consumer behaviour as discipline and Science, Ethics in marketing.

Module 2 (10 Hours)
Consumers as individuals: - Consumer motivation, consumer perception, consumer learning, personality and life styles, attitudes, attitude change, communications and CB.

Module 3 (10 Hours)
Consumers as decision makers: - Consumer influence and diffusion of innovations, individual decision making, group influence and opinion leadership.

Module 4 (9 Hours)
Consumers in their social and cultural settings: - Social class and CB, influence of culture, subculture and CB, income, Age, Ethnic, racial and religion subcultures.

References:

1. Schiffman & Kanuk, "Consumer Behavior", 7/e, Pearson Education, (2000).
2. Solomon, "Consumer Behavior", 5/e, Pearson Education, (2001).
3. Peter & Olson, "Consumer Behavior and Marketing Strategy", 6/e, TMH, (2001).
4. Arnould, Linda and Zinkhan, "Consumers", TMH, (2001).

MEA635 SOFT COMPUTING TECHNIQUES

L	T	P	C
3	1	0	3

Module 1 (11 Hours)

Genetic Algorithms: Introduction to Genetic Algorithms (GA) - Goals of optimization - Differences and similarities between genetic algorithm and traditional methods - Schemata - Terminology of GA - Strings, Structure, Parameter set - Coding - Fitness function - Data structures - GA operators - Algorithm.

Module 2 (6 Hours)

Simulated Annealing: Introduction - Algorithm - Applications.
Tabu Search: Introduction - Algorithm - Applications.

Module 3 (11 Hours)

Fuzzy Logic: The concept of uncertainty and associated solutions - Fuzzy sets - Basic properties and characteristics of fuzzy sets - Fuzzy set operations - Fuzzy reasoning - Major components of a fuzzy logic system - Design aspects of fuzzy systems - Applications of fuzzy logic.

Module 4 (11 Hours)

Artificial Neural Networks: Basics of artificial neural networks (ANN) – Characteristics of ANN - Historical development - Terminology - Models of neuron – Topology - Basic learning laws - Overview of neural computing - Neural approaches to computing - Engineering approaches to computing - Relationship of ANNs to other technologies - ANNs Learning Approches - Training set and Test set - Generalization - Learning curves - Applications of ANN in optimization - Simple examples.

References:

1. Deb, K, Optimization for Engineering Design, Prentice Hall of India (P) Ltd., New Delhi, 1998.
2. Goldberg, D.E., Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.
3. Schalkoff , R.J., Artificial Neural Networks, McGraw-Hill Companies Inc., 1997.
4. Sundareswaran, K., A Learner's Guide to Fuzzy Logic Systems, Jaico Publishing House, 2005.
5. Yegnanarayanan, B., Artificial Neural Networks, Prentice Hall of India, 1999.

MEA636 RISK MANAGEMENT AND INSURANCE

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Basic concept of risk and insurance: - risk, meaning, type, insurance, characteristics, types, risk management, objectives, steps in RM, losses evaluation, legal principle, in risk and insurance.

Module 2 (10 Hours)
Personal property and liability risks: - Liability risks, House owners insurance, automobile insurance, other property and liability insurance coverage.

Module 3 (10 Hours)
Commercial property and liability risks: - commercial property insurance, commercial liability insurance, crime insurance.

Module 4 (9 Hours)
Life and Health insurance: - Fundamentals, types, individual health and disability – income insurance, group life and health insurance, retirement plans.
Special topics – insurance company operation, insurance pricing.

References:

1. Harrington and Niehaus, "Risk Management and Insurance", TMH, (1999).
2. Williams, Young and Smith, "Risk Management and Insurance", 8/e, TMH, (1988).
3. Rejda, "Principles of Risks Management and Insurance", 7/e, Pearson Education, (2001).

MEA637 HUMAN RESOURCE MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Introduction: Definition of personnel management, concept of labour, organisation and function of the personnel department, personnel policies.
Organisational objectives, functions, relationships, organisational structure of formal and organisations, job design.

Module 2 (10 Hours)
Manpower planning: Man power forecasting, mobility and promotion problems, job analysis and job description.
Selection: Developing sources, methods of recruitment, alternative selection policies, application blanks and qualification card, interviews, psychological testing.
Training: The nature of training, objectives in training, types of training, requirements of effective training conventional training techniques, group training, organisation development, evaluating training effectiveness.
Performance appraisal: Traditional performance appraisal systems, appraisal programs.

Module 3 (10 Hours)
Wage and Salary Administration: Factors affecting compensation policy - equity and compensation - comparable value, job evaluation, job evaluating systems - simple ranking - job grading - point systems - factor comparison system, effects of job evaluation on human relations, Expectancy theory and compensation, variable compensation, supplementary compensations.

Module 4 (9 Hours)
Human Factor Management: Human factors in management behavioural models, motivation, Maslow's hierarchy of needs theory - hygiene approach to motivation, expectancy theory, reinforcement theory Mc-clleland's needs theory, motivational techniques.
Leadership: Definition, trait approaches to leadership, leadership behaviour and styles, situational approach to leadership.
Communication and Counselling: Nature and importance of communications, channels and structure, communication process, Management by objectives, counselling.

References:

1. Scott, Clothier, Springel, Personnel Management, McGraw Hill
2. Strauss and Sayles Personnel, The Human Problems of Management, Prentice Hall.
3. Edwon, B. Fillipo, Personnel Management
4. Koontz, O. Donnel, Weihreich, Essentials of Managemnt, McGraw Hill
5. Kapoor, N.D., Introduction to Commercial & Industrial Law, Sultan Chand & Sons.

MEA638 DECISION SUPPORT AND EXPERT SYSTEMS

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Introduction: Information systems, Human Information Processing, Newell and Simon model for human information processing-intelligence stage, decision stage, choice stage, Rasmussen model of judgment and choice, The Klein model Information and information value, Classification of decisions, Types of information systems, Decision support system.

Decision Support Systems (DSS): Subsystems in DSS-data management subsystem, model management subsystem, dialogue management subsystem, Computer Hardware for DSS, Group Decision Support Systems (GDSS).

Module 2 (10 Hours)

Knowledge-Based Expert System (KBES): Introduction, What is KBES, Architecture of KBES-knowledge base, predicate logic, Production rules, Procedural programs, Inference mechanisms-backward chaining, forward chaining, inexact reasoning, non-monotonic reasoning, reasoning based on certainty factors, expert system development shell.

Search Techniques: Introduction, Problem definition and solution process, Production systems, Search techniques-breadth first search, heuristic search, agenda-driven search, Problem decomposition and AND-OR graphs.

Module 3 (10 Hours)

Engineering Design Synthesis: Synthesis, Decomposition model for synthesis, building plant layout at a site-an example, Role of a synthesiser in KBES environment, An architecture for a synthesiser-a genetic tool.

Criticism and Evaluation: Methodologies used in a knowledge-based environment, A framework for critiquing and evaluation-knowledge representation framework, inference mechanism, Algorithm for overall rating of a hierarchical solution.

Module 4 (9 Hours)

Applications of Decision Support Systems: Decision support in office information systems, Auditing, artificial intelligence and expert systems, Decision support systems for resource allocation.

Process Models and Knowledge-Based Systems: Expert systems for diagnosis-understanding of domain knowledge, evolution of knowledge nets, transformation of knowledge from nets to rule base, Blackboard model of problem solving-blackboard architecture, blackboard framework, integrated engineering system, an illustrative example, Conceptual Design of a Car Body Shape.

References:

1. Holsapple, W. Clyde and Whinston B. Andrew (ed), Decision Support Systems for Engineers: Theory and Application, Springer-Verlag, New York, 1987.
2. Janakiraman V.S. and K. Sarukesi, Decision Support Systems, Prentice Hall of India, New Delhi, 1989.
3. Krishnamoorthy C.S. and S. Rajeev, Artificial Intelligence and Expert Systems for Engineers, CRC Press Inc., New York, 1996.
4. Bielawski Larry and Lewand Robert, Expert Systems Development: Building PC-Based Applications, QED Information Sciences Inc., Wellesley, Massachusetts, 1988.

5. Ermine Jean-Louis, Expert Systems: Theory and Practice, Prentice Hall of India, New Delhi, 1999.
6. Jackson Peter, Introduction to Expert Systems, Addison-Wesley Publishing Company, 1986.
7. Turban E., Decision Support and Expert Systems, Macmillan, New York, 1990.

MEA639 SYSTEMS MODELLING AND SIMULATION

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

System Concept: Systems and system environment, Components of a system, Discrete and continuous systems, Systems approach to problem solving, Types of system study, System analysis, system design and system postulation, System modelling, Types of models.

System Simulation: Technique of simulation, Comparison of simulation and analytical methods, Types of system simulation, Steps in simulation study, Monte Carlo simulation.

Concepts in Discrete Event Simulation: Event scheduling/Time advance algorithm, Modelling world views, Simulation programming tasks, Comparison and selection of simulation languages.

Module 2 (10 Hours)

Random Number Generation: Techniques for generating random numbers, Linear congruential method, Test for random numbers, Frequency tests, run tests, tests for autocorrelation, gap test, and Poker test.

Random Variate Generation: Inverse transformation technique, Exponential, Uniform, Weibull, Triangular, Empirical-Discrete and continuous distributions. Convolution method, Acceptance-Rejection technique.

Input Modelling for Simulation: Data collection, Identifying the distribution with data, Parameter estimation, Goodness of fit test, Chi square, Klomogrov and Smirnov tests, Selecting input model when data are not available.

Module 3 (10 Hours)

Verification and Validation of Simulation Models: Verification of simulation models, Calibration and validation of models, Face validity, Validation of model assumption, validating input-output transformation, Input-output validation using historical input data.

Output Analysis for a Single Model: Measures of performance and their estimation, Point estimation, Interval estimation, Output analysis for terminating simulations and Steady state simulations.

Metamodelling: Simple linear regression, Testing for significance of regression, Multiple linear regression.

Module 4 (9 Hours)

Simulation Modelling and Analysis of Manufacturing Systems: Objectives, Performance measures, Issues in simulation of manufacturing systems, Simulation software for manufacturing applications, Simulation of job shop manufacturing systems, Simulation Modelling and Analysis of Single Server and Single Queue Systems, Inventory systems and PERT networks.

References:

1. Banks, J., Carson, J.S., Nelson, B.L., and Nicol, D.M., Discrete-Event System Simulation, Third Edition, Pearson Education, Inc., 2001.
2. Deo, N., System Simulation with Digital Computer, Prentice Hall of India, 1997.
3. Askin R.G. and Standridge, C.R., Modelling and Analysis of Manufacturing Systems, John Wiley & Sons, 1993.

4. Gordon, G., System Simulation, Second Edition, Prentice Hall of India, 1995.
5. Law, A.W. and Kelton, W.D., Simulation Modelling and Analysis, Third Edition, McGraw Hill International, 2000.
6. Ross, S.M., Simulation, Third Edition, Academic Press, 2002.
7 Fishman, G.S., Concepts and Methods in discete Event Digital Simulations, Wiley, New York, 1973.
9. Les Oakshott., Business Modelling and Simulation, Pitman Publishing, 1997.
10. Carrie, A., Simulation of Manufacturing Systems, John Wiley & Sons Ltd., 1988.

MEA640 DATA BASE MANAGEMNT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Database systems - purpose - Abstraction - models, Instances and Schemes - Data independence - Data Definition Language - Data Manipulation Language.

Entity Sets - Relationship Sets - attributes - Mapping Constraints - keys - ER Diagrams. Generalisation - Aggregation.

Module 2 (10 Hours)

Structure of Relational Databases - Relational algebra - Tuple relational calculus - Domain relational calculus - modifying the data base - views - SQL - Quel.

Integrity Constraints - Domain Constraints, Referential integrity - functional dependencies - assertions - triggers.

Module 3 (10 Hours)

Relational Data base design - pitfalls - Normalisation's using functional, Multi-valued and join dependencies, domain key normal form - alternative approaches.

File organisation - sequential files - Mapping relational data to files - Data dictionary Storage - Buffer Management - Indexing - Basic concepts - B^+ and B-tree index files - Static hash function - dynamic hash function - comparison of Indexing and Hashing.

Module 4 (9 Hours)

Query Processing - Interpretations - equivalence of expressions - Estimating cost of Query processing and access using Index.

Security and Integrity - Violations - Authorisation and views - encryption - Data validation - Multiple user access.

References:

1. Korth H.F. & Silberschatz, Database System Concepts, Second edition, Mcgraw Hill International Editions, 1991.
2. P. O'NEL and E O'NEIL, Data base: Principles, Programming and Performance, 2/e, Harcourt Asia PTE Ltd., 2001.

MEA641 ENTERPRISE RESOURCE PLANNING

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Introduction to Enterprise Resource Planning (ERP) - History of ERP – Requirements generation to Material Requirements Planning (MRP) – Closing the MRP loop – Manufacturing Resource Planning (MRP II) – Just-In-Time to Lean manufacturing – ERP – Internet's impact on ERP – Supply chain management.

Module 2 (10 Hours)
Systems and technology background – ERP systems background – ERP data input – ERP output capabilities – Reengineering - How does ERP create value – Why investigate ERP systems.

Module 3 (10 Hours)
ERP Life Cycle - Deciding to go ERP - Choosing an ERP system - Designing ERP systems - Should prune processes or ERP software be changed - Choosing standard model - Artifacts and processes.

Module 4 (9 Hours)
Implementing ERP systems – Big bang versus phased – After going live – training – ERP and electronic commerce – ERP Risks – Successes and failures.

References:

1. Garg, V.K., and Venkitakrishnan, N.K., Enterprise Resource Planning: Concepts and Practice, Prentice-Hall of India Private Limited, New Delhi, 1998.
2. O'Leary, D.E., Enterprise Resource Planning Systems: System, Life cycle, Electronic Commerce and Risk, John Wiley & Sons, 2001.
3. Ptak, C.A., and Eli, S., ERP Tools, Techniques and Applications for Integrating the Supply Chain, St. Lucie Press/APICS Series on Resource Management, 2000.
4. Wallace, T.F., and Kremzar, M.H., ERP: Making it Happen: The Implementer's Guide to Success with Enterprise Resource Planning, John Wiley & Sons, 2001.

MEA642 PRODUCTION ACIVITY CONTROL

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Capacity Planning and Utilisation: Role of capacity planning in manufacturing planning and control system, Capacity planning and control techniques, Scheduling capacity and materials simultaneously, Capacity monitoring with input/output control, Measure of capacity

Production Activity Control: Framework, JIT effect on production activity control, Shop floor control concepts, Techniques- Gantt chart, Finite loading systems, Priority Rules, Theory of constraints (TOC) systems, CONWIP based production activity control, Internet and vendor scheduling

Module 2 (10 Hours)

Just-in-Time(JIT): JIT in Manufacturing planning and control, JIT principles, JIT objectives and building blocks.

Pull Production Systems: Pull systems and push systems, Conditions for pull production, Mechanism for signal and control - containers and cards – Conveyance kanbans and production kanbans, Conditions for pull production, Techniques of pull production, CONWIP method of pull production

Module 3 (10 Hours)

Simplified Production Planning and Control Systems: Production levelling – Requirements for levelling- Levelling master schedule, Mixed model production, JIT based planning and scheduling in different manufacturing environment, Balancing for mixed model production, Adapting MRP-based production planning system to pull production.

Module 4 (9 Hours)

Advanced Concepts in Scheduling: Due date setting procedures, Dynamic due dates, Labour-limited systems, Group scheduling and transfer batches; Multiple-constrained scheduling.

Manufacturing Planning and Control Implementation: Lean manufacturing to lean organisation to lean enterprise, Database rationalisation, Interfirm integration, Transformation, Project management, Benchmarking and auditing.

References:

1. John Nicholas, Competitive Manufacturing Management: Continuous Improvement, Lean Production and Customer-Focused Quality, Tata McGraw-Hill Edition 2001
2. Thomas E. Vollmann, William L. Berry, D Clay Whybark, and F. Robert Jacobs, Manufacturing Planning and Control for Supply Chain Management, Fifth Edition, Mc Graw Hill, International Edition. 2005
3. Seetharama L. Narasimhan, Dennis W. McLeavy and Peter J. Billington, Production Planning and Inventory Control, Second Edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2000.
4. Edward A. Silver, David F. Pyke and Rein Peterson, Inventory Management and Production Planning and Scheduling, Third Edition, John Wiley & Sons, 1998.

MEA643 LEAN PRODUCTION MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)

Small-Lot Production: Lot-size Basics; Lot sizing; Lot-size Reduction; Facilitating Small Lot Size.

Setup-Time reduction: Setup_Reduction Methodology; Techniques for Setup-Reduction; Setup_Reduction Projects.

Module 2 (10 Hours)

Pull Production Systems: Pull Systems and Push Systems; Conditions for Pull Production Systems; How to achieve Pull Production; Mechanisms for Signal and Control.

Workcells and Cellular Manufacturing: Cell layout and Capacity Measures; Design of Workcells; Worker Assignment; Implementation Issues.

Module 3 (10 Hours)

Scheduling for Smooth Flow: Production Leveling; Level Scheduling in Pull Production; Master Production Scheduling.

Synchronising and Balancing Process: Synchronisation; Bottleneck Scheduling; Balancing; Adapting to Schedule changes.

Module 4 (9 Hours)

Planning and Control in Pull Production: Centralised Planning and Control System; Decentralised planning and Control system; Adapting MRP-Based Production Planning and Control System to Pull production

Maintaining and Improving Equipment: Equipment Maintenance; Equipment Effectiveness; Total Productive Maintenance.

References:

1. Harold J. Steudel and Paul Desruelle (1992). Manufacturing in the Nineties - How to Become a Lean, World-Class Competitor, Van Norstrand Reinhold, New York
2. John Nicholas (1998). Competitive Manufacturing Management - Continuos Improvement, Lean Production, and Customer-Focused Qualities, McGraw-Hill International Editions.

MEA644 INVESTMENT MANAGEMENT

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Investment environment: - securities and market, investment process, capital market, primary and secondary, efficient markets.

Module 2 (10 Hours)
Investment theory: - Portfolio selection problem, Portfolio analysis, CAPM, Factor models, Arbitrage pricing theory.

Module 3 (10 Hours)
Common stocks – characteristics, financial analysis of common stocks, dividend, earnings, investment management and performance evaluation.

Module 4 (9 Hours)
Fixed income securities: - Types, Bond valuations, Bond analysis and portfolio management.
Mutual funds, options, futures and international investing.

References:

1. Alexander, Sharpe and Bailey, "Investments", 3/e, PHI, (2002).
2. Bodie, "Essentials of investments", 4/e, TMH, (2001).
3. Corrado & Jordan, "Fundamentals of investments", 2/e, TMH, (2001).
4. Haugen, "Modern Investment Theory", 5/e, PHI, (2002).

MEA645 TAKEOVERS AND CORPORATE RESTRUCTURING

L	T	P	C
3	1	0	3

Module 1 (10 Hours)
Takeovers and Mergers in Practice: Takeover process, merger process, legal aspects, Accounting for M & A.

Module 2 (10 Hours)
M & A theory: Strategic processes, theories of mergers, timing of merger activity, empirical tests, valuation approaches.

Module 3 (10 Hours)
Restructuring : Restructuring and divestitures, Restructuring organisations and ownership, financial restructuring.

Module 4 (9 Hours)
Special topics: Joint ventures and alliances, share repurchase, Takeover defenses, International takeovers and restructuring, corporate governance.

References:

1. Benninga "Corporate Finance – Valuation approach" TMH, (1997).
2. Weston, Siu and Johnson "Takeovers, Restructuring and Corporate Governance" 3/e, Pearson Education, (2001).

MEA795 COMPREHENSIVE VIVA

L	T	P	C
0	0	0	1

Each student is required to appear for the Comprehensive Viva-Voce examination in the third semester. This is an oral examination based on the courses (Theory, Laboratory and seminar) undergone by the student in the first and second semester M. Tech. Programme.

MEA796 PROJECT

L	T	P	C
0	0	0	20

The project work starts in the third semester and extends to the end of the fourth semester. The student will be encouraged to fix the area of work and conduct the literature review during the second semester itself. The topic shall be research and development oriented. The project can be carried out at the institute or in an industry/research organization. Students desirous of carrying out project in industry or other organization have to fulfill the requirements as specified in the "Ordinances and Regulations for M. Tech. under the section - Project Work in Industry or Other Organization".

At the end of the third semester, the students' thesis work shall be assessed by a committee and graded as specified in the "Ordinances and Regulations for M. Tech.". If the work has been graded as unsatisfactory, the committee may recommend a suitable period by which the project will have to be extended beyond the fourth semester.

At the end of the fourth semester, the student shall present his/her thesis work before an evaluation committee, which will evaluate the work and decide whether the student may be allowed to submit the thesis or whether he/she needs to carry out additional work.

The final viva-voce examination will be conducted as per the "Ordinances and Regulations for M. Tech.".