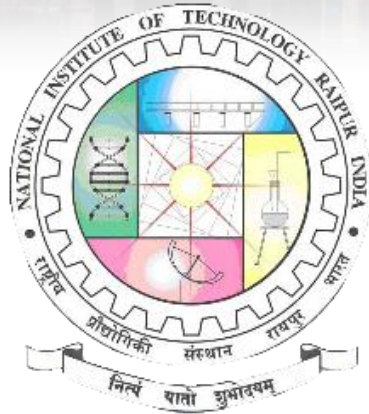




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(INSTITUTE OF NATIONAL IMPORTANCE)
G.E. Road, Raipur, Chhatisgarh - 492010, C.G. (INDIA)

Department of Mechanical Engineering M. Tech. Industrial Engineering & Management (IE&M) Scheme and Syllabus



**NATIONAL INSTITUTE OF TECHNOLOGY
RAIPUR, INDIA**



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Vision:

“To produce innovative, entrepreneurial and successful engineers and technologists of high caliber for the nation, to serve as a valuable resource for industry, academia and society”

Mission:

1. To provide the students and the faculty with opportunities to create, interpret, and apply the knowledge in the field of Mechanical Engineering.
2. Provide technological service to local, national, and international communities.

Programme Educational Objectives:

Under the Post-graduate Mechanical Engineering program in Industrial Engineering & Management, the objectives aim to produce qualified Mechanical Engineering Post graduates who will:

1. Possess advanced knowledge and understanding of the specialization thus enabling them to tackle on-field problems, as well as pursue further academic achievements through research.
2. Possess entrepreneurial, managerial, analytical, decision-making, problem solving and communication skills.
3. Conduct themselves in a responsible, professional and ethical manner.
4. Inculcate an attitude for life-long learning process.

Programme Outcomes:

The post graduate program in Industrial Engineering & Management has been designed to prepare graduates who will:

1. Possess knowledge of modern managerial and industrial concepts, conduct in depth analysis and studies and apply expertise practically.
2. Work as well as manage multi-disciplinary projects to enhance skills, make effective oral presentations and prepare technical documents effectively.
3. Develop professional and ethical attitude and become socially responsible citizens.
4. Be able to understand global issues and conduct independent research in the emerging areas.



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National Institute of Technology Raipur (C.G.)

Department of Mechanical Engineering

Course of Study							M.Tech. First Semester						
S.No.	Board of Studies	Course Code	Course Name	Periods/Week			Examination Scheme					Total Marks	Credit L+(T+P)/2
				L	T	P	TA	FE	SE	ESE	Pract. ESE		
1	Mechanical	ME43111 (ME)	Work Design and Measurement	3	1	-	20	15	15	100	-	150	4
2	Mechanical	ME43112(ME)	Decision Modelling	3	1	-	20	15	15	100	-	150	4
3	Mechanical	ME43113 (ME)	Management Information System	3	1	-	20	15	15	100	-	150	4
4	Mechanical	ME43114 (ME)	Computer Methods for Management	3	1	-	20	15	15	100	-	150	4
5	Mechanical	-----	Elective-I*	3	1	-	20	15	15	100	-	150	4
6	Mechanical	ME43121(ME)	Decision Modelling Lab	-	-	3	75	-	-	-	50	125	2
7	Mechanical	ME43122(ME)	Computer Methods for Management Lab	-	-	3	75	-	-	-	50	125	2
Total				15	5	6	250	75	75	500	100	1000	24

Elective-I*

S.No.	Course	Code	S.No.	Course	Code
1	Production and Operation Management	ME43241(ME)	6	Safety Aspect of Industrial and Manufacturing System	ME43246 (ME)
2	Project Management	ME43242 (ME)	7	Optimization Techniques	ME43247 (ME)
3	Agile Manufacturing	ME43243 (ME)	8	Creative Problem Solving Techniques	ME43248 (ME)
4	Research Methodology	ME43244 (ME)	9	Organizational Theory Design and Development	ME43249 (ME)
5	Statistics for Management	ME43245 (ME)	10	Computer Integrated Manufacturing	ME432410(ME)



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National Institute of Technology Raipur (C.G.)													
Department of Mechanical Engineering													
Course of Study					M.Tech. Second Semester								
S.No.	Board of Studies	Course Code	Course Name	Periods/Week			Examination Scheme					Total Marks	Credit L+(T+P)/2
				L	T	P	TA	FE	SE	ESE	Pract. ESE		
1	Mechanical	ME43211(ME)	Quality Assurance	3	1	-	20	15	15	100	-	150	4
2	Mechanical	ME43212(ME)	Logistics and Supply Chain Management	3	1	-	20	15	15	100	-	150	4
3	Mechanical	ME43213(ME)	Product Development and Management	3	1	-	20	15	15	100	-	150	4
4	Mechanical	ME43214ME	Management and productivity	3	1	-	20	15	15	100	-	150	4
5	Mechanical	-----	Elective-II**	3	1	-	20	15	15	100	-	150	4
6	Mechanical	ME43221(ME)	Project on Product Development	-	-	3	75	-	-	-	50	125	2
7	Mechanical	ME43222(ME)	Lab (Seminar)***	-	-	3	75	-	-	-	50	125	2
				15	5	6	250	75	75	500	100	1000	24

Elective-II **

S.No.	Course	Code	S.No.	Course	Code
1	Enterprise Resource Planning	ME43231(ME)	6	Human Resource Management	ME43236 (ME)
2	Financial Management	ME43232(ME)	7	Customer Relationship Management	ME43237 (ME)
3	International Business Management	ME43233(ME)	8	E-Commerce Technology and Management	ME43238 (ME)
4	Strategic Management	ME43234 (ME)	9	Database Management System	ME43239 (ME)
5	Security Analysis and Portfolio Management	ME43235 (ME)	10	Decision Support System	ME432310(ME)

***Usually new topics not covered in the syllabus will be given to each student. He/She will be asked to make a presentation in the class in seminar period.



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National Institute of Technology Raipur (C.G.)

Department of Mechanical Engineering

Course of Study

M.Tech. Third Semester

S.No.	Board of Studies	Course Code	Course Name	Periods/Week			Examination Scheme					Total Marks	Credits L+(T+P)/2
				L	T	P	TA	FE	SE	ESE	Pract. ESE		
1	Mechanical	ME43321(ME)	Preliminary Work on Dissertation	-	-	24	100	-	-	-	200	300	12
2	Mechanical	ME43322(ME)	Comprehensive Viva Voce & Seminar	-	-	-		-	-	-	200	200	4
Total				0	0	24	100	0	0	0	400	500	16



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National Institute of Technology Raipur (C.G.)

Department of Mechanical Engineering

Course of Study

M.Tech. Fourth Semester

S.No.	Board of Studies	Course Code	Course Name	Periods/Week			Examination Scheme					Total Marks	Credit L+(T+P)/2
				L	T	P	TA	FE	SE	ESE	Pract. ESE		
1	Mechanical	ME43421(ME)	Dissertation	-	-	32	200	-	-	-	300	500	16
Total				0	0	32	200	0	0	0	300	500	16



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Work Design and Measurement
Course Code: ME43111ME
Semester: First

Core/ Elective: Core
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES:

At the end of the course, Student will be able:

1. To understand the need and importance of productivity.
2. To critically analyze existing methods of doing the job and evolve efficient and economical methods.
3. To understand ways of determining standard time for completing the job.
4. To apply work analysis and work measurement to office work.

SYLLABUS

PRODUCTIVITY CONCEPTS AND TECHNIQUES FOR ITS IMPROVEMENT

Introduction, Definitions of productivity, Productivity of materials, Productivity of land, buildings, machines and manpower, Factors contributing to productivity improvement, Work content and ineffective time, Improving productivity by reducing work content, Improving productivity by reducing ineffective time, Management of productivity.

WORK STUDY

Introduction, Definition, Basic procedure, Prerequisites of conducting a work study, the human factor in the application of work study, the influence of working conditions on work study, Ergonomics.

METHOD STUDY

Introduction to method study and the selection of job, Definition and objectives of method study, Procedure, Selection of job, recording of facts: Flow process charts, Man type, Material type, Equipment type, Critical Examination: The questioning technique, The principles of motion economy, Micro motion study, The simo chart Development & installation of improved method.

WORK MEASUREMENT

Purpose of work measurement, The techniques of work measurement, Time study & work sampling method, Rating, Allowances, Determination of standard time, PTS.



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WORK DESIGN FOR OFFICE WORK

Organization and methods, Work measurement of office work, Work analysis techniques applied to support staff, Form design and control.

TEXT BOOKS

1. Barnes, R.M. Motion and Time Study, Design and measurement of work, John Wiley sons (Asia)
2. ILO, Introduction to Work Study, Oxford and IBH publishing.

REFERENCE BOOKS

1. Benjamin W.Niebel, AndrisFreivalds, Methods, standards & Work Design, McGraw Hill
2. Maynard H.B, Industrial Engineering Hand book, McGraw-Hill



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Decision Modeling
Course Code: ME43112ME
Semester: First

Core/ Elective: Core
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES: After studying this subject, Student will be able to:

1. Develop mathematical model of real life situations/problems.
2. Solve the different LPP, transportation, assignment problem by different methods/algorithms.
3. Develop network model of real life problem and analyze/solve/synthesize by different algorithms like shortest route, minimum spanning tree, maximum flow etc.
4. Optimize multi-objective problem through different algorithms.
5. Develop sequential, deterministic and stochastic case modules and solve/analyze the problem through forward and backward recursion equations and Markov Process.

SYLLABUS

INTRODUCTION

Theory of Simplex Method, Duality Theory, Dual simplex method, Revised simplex method, Transportation, Assignment, Sensitivity analysis.

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

NETWORK MODELS AND DECISION

Shortest Route problems, Minimal spanning tree problems, Maximal flow problems. 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

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.



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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.

Text Book:

1. Hillier, F.S. and Liberman, G.J. Introduction To Operation Research, McGraw-Hill International edition, 2001.
2. Rao, S.S. Optimization: Theory and Application, Second edition, Wiley eastern,

References:

1. Ravindran, A., Philips, D.T. and Solberg, J.J., Operation Research: Principles and Practice, Second Edition, John Wiley & Sons, 1987.
2. Taha, H.A., Operation Research: An Introduction, Sixth Edition, Prentice-hall of India, New Delhi, 1999.
3. Beighler, C., Philips, D., and Wild, D., Foundation of Optimization, Second Edition, Prentice-Hall, New Jersey, 1979.
4. Deb, K., Optimization in Engineering Design Prentice-Hall of India, New Delhi, 1994.
5. Papadimitriou, C.H. and Stegitz, K., Combinatorial Optimization: Algorithm and Complexity, Prentice-Hall, New Jersey, 1982.
6. Simmons, D.M., Ravindran, A., Non-linear Programming for Optimization Research, Prentice-Hall, New Jersey, 1975.
7. Reklatis, G.V., Ravindran, A., and Ragsdell, K.M., Engineering optimization: Methods and application, Wiley Interscience, New York, 1983.
8. Budnick F.S., McLeavey and R. Mojena, Principles of Operation Research for Management, 2/e, Richard D. Irwin Inc., Homewood, Illinois, 1991.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Management Information System
Course Code: ME43113 ME
Semester: First

Core/Elective: Core
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES: At the end of this course, the students are expected to be able to:

1. To classify and distinguish data, information and knowledge in context of information management.
2. To construct database management system and data model to enhance the performance of an organization.
3. To develop management information system illustrating various structured analysis tools.

SYLLABUS

INTRODUCTION

MIS Framework, Importance, Concept, Definition, Nature and Scope, Structure and Classification, Types of Information, Information Quality, Dimensions of Information, Human as an Information Processing System

INFORMATION TECHNOLOGIES

Basics of Computer System, Computer Software, Hardware and Programming Languages. Database Management System (DBMS), Database Hierarchy, Types of Database Structures or Data Models, Structured Query Language (SQL), Advances in Database Technology.

BUSINESS APPLICATIONS OF INFORMATION SYSTEMS

E business and E Commerce- Introduction, Cross functional Enterprise Information System, E-Commerce, Decision Making and Decision Support System (DSS).

DEVELOPMENT OF MIS

System Development Approaches, System Development Stages, System Analysis and Design, Structured Analysis Tool, Application of Operational Information Systems to Business.

MANAGEMENT OF INFORMATION RESOURCES

Implementation Processes, Maintenance, Evaluation and Security of Information System, Protection of Information System, Information System Planning, The four Stage Model of IS, Information Resource Management (IRM), Organization of Information System and End-User Computing.



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TEXT BOOKS

1. Robert Schultheis and Mary Summer, Management Information Systems –The Managers View, Tata McGraw Hill, 2008.
2. Goyal D.P., Management Information Systems –A Managers Perspective, Macmillan Publishers.

REFERENCES

1. Kenneth C. Laudon and Jane Price Laudon, Management Information Systems –Managing the digital firm, PHI Learning / Pearson Education, PHI, Asia, 2002.
2. Gupta Uma G., Management Information Systems –A Managers Perspective, Galgotia Publications.
3. Gordon Davis, Management Information System: Conceptual Foundations, Structure and Development, Tata McGraw Hill, 2000.
4. Haag, Cummings and Mc Cubbrey, Management Information Systems for the Information Age, McGraw Hill, 2005.
5. Turban, McLean and Wetherbe, Information Technology for Management –Transforming Organizations in the Digital Economy, John Wiley, 2007.
6. Raymond McLeod and Jr. George P. Schell, Management Information Systems, Pearson Education, 2007.
7. James O Brien, Management Information Systems – Managing Information Technology in the E-business enterprise, Tata McGraw Hill, 2002.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Computer Method for Management
Course Code: ME43114ME
Semester: First

Core/ Elective: Core
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES:-

At the end of this course, the students will be able to:

1. Develop flowcharts and create programmes for solution of simple problems.
2. Understand structured programming concepts especially related to managerial theories.
3. Execute managerial algorithms using Matlab/C/Excel.
4. Solve the managerial problems using computer programming.

SYLLABUS

FUNDAMENTALS OF PROGRAMMING IN C/ MAT LAB:

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.

PROGRAMMING AND PROBLEM SOLVING IN C / MAT LAB:

Computer organization, Steps involved in computer programming, developing algorithms and flow charts for business problem, Efficiency of algorithms, Program design methods, Top-down modular programming, Measures of program performance.

SUPPLY CHAIN NETWORK DESIGN:

Basics of Network, Decisions, Mathematical modelling for supply chain echelons with flow, structure, capacity constraints etc.

Algorithms for solving Network design problems Flow, capacity based problems, integer problems, and binary problems

COMPUTERIZED LAYOUT PLANNING:

Quantitative, Qualitative, and multi-objective, Limitation of Computerized Layout Planning, Flow Dominance, Complexity Rating, Solution Efficiency

Location Factors, Location Theory, Nature, Significance and Scope of Facilities Layout Planning, Basic Philosophy in Computerized Layout Planning, Construction and Improvement Algorithms, Major features of Improvement Algorithms.



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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, Modie and Young method.

Text books

1. Francis, R.L. and White, J.A., Facility Layout and Location: An Analytical Approach, Prentice-Hall Inc., New Jersey, 1974.
2. Chopra, S. and Meindl P., Supply Chain Management: Strategy, Planning, and Operation, Pearson Education, Inc., Upper Saddle River, New Jersey, 2007
3. Wild, R., Mass Production Management, John Wiley and Sons, New York, 1972.
4. Apple, J.M., Plant Layout and Material Handling, John Wiley and Sons, New York, 1977.
5. Singh R. P., Introduction to Matlab, Indian Edition, 2010.

References

1. Tompkins and White, Facilities Planning, John Wiley and Sons, New York, 2010.
2. Moore, J.M., Plant Layout and Design, Macmillan Company, New York, 1970.
3. Kelly, A. and Pohl, I., A book on C, Pearson Education, 2001.
4. Tremblay, J. P., Sorenson, P. G., An introduction to data structures with applications, McGraw-Hill College; 2nd edition 1984.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Optimization Techniques
Course Code: ME43247 (ME)
Semester: First

Core/Elective: Elective
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

Course Outcomes: Upon completing the subject, the student will be able to:

1. Acquire knowledge and develop basic understanding of the concepts of optimization and mathematical modelling.
2. Acquire knowledge for basic modelling techniques to formulate the real life practical problems into a mathematical model.
3. Use different direct and gradient based optimisation method to solve single and multivariable un-constrained or constrained nonlinear function for minimization or maximization.
4. Use non-traditional optimization methods such as Genetic Algorithms, Simulated Annealing, Global Optimization.
5. Application of software for optimization and develop the computer programs for different optimization algorithms.
6. Get aware to Goal Programming, Advanced Optimization Techniques and Dynamic Programming

Syllabus:

Introduction, Single Variable Optimization, Bracketing Methods (Exhaustive Search Method, Bounding Phase Method), Region Elimination Methods (Interval halving Method, Fibonacci Search Method, Golden Section Method), Point Estimation Methods, Gradient Based Methods (Newton-Raphson Method, Bisection Method, Secant Method, Cubic Search Method)

Multivariable Optimization Techniques, Unidirectional Search Methods, Direct Search Methods (Evolutionary Optimization Method, Simplex Search Method, Hooke-Jeeves Pattern Search Method, Powell's Conjugate Direction Method), Gradient Based Methods (Cauchy's Steepest Descent Method, Newton's Method, Marquardt's Method, Conjugate Gradient Method, Variable –Metric Method)

Constrained Optimization Algorithms, Transformation Methods (Penalty Function Method, Method of Multipliers), Direct Search (Variable Elimination Method, Complex Search Method, Random Search Method), Linearized Search (Frank-Wolfe Method, Cutting Plane Method), Feasible Direction Methods, Reduced Gradient Methods, Gradient Projection Methods



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Linear Programming, Simplex Method, Transportation Problem, Dual Phase Methods, Dual Simplex method Non Traditional optimization, Genetic Algorithms, Simulated Annealing, Global Optimization Specialized Algorithms, Software related to Optimization, Goal Programming, Advanced Optimization Techniques, Introduction to Dynamic Programming.

Textbooks:

- [1] S. S. Rao, Optimization: Theory and Applications
- [2] Kalyanmoy Deb, Optimization for Engineering Design
- [3] Mohan C Joshi & K. M. Moudgalya



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DEPARTMENT OF MECHANICAL ENGINEERING
PROGRAMME: M. TECH. IN INDUSTRIAL ENGINEERING AND MANAGEMENT

COURSE Title: COMPUTER INTEGRATED MANUFACTURING CORE/ELECTIVE: ELECTIVE
COURSE CODE: ME432410 ME CONTRACT HOURS AND CREDIT
SEMESTER: FIRST

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES:

The student will achieve an understanding of the issues related to computer-integrated manufacturing and the integration of automated processes within a modern manufacturing environment. From the course students are able:

1. To select an automated processes in a modern manufacturing environment.
2. To express engineering design and modeling techniques towards flexible manufacturing system, robotics, numerical control and the integration of computer control/usage in manufacturing.
3. To demonstrate contemporary manufacturing/production strategies such as group technology, rapid prototypes and reverse engineering.
4. To describe the operation and applications of PLC and enhance the quality of product by using CIM & CAQC.

SYLLABUS

FUNDAMENTAL OF MANUFACTURING AND AUTOMATION

Production operation and automation strategies, Manufacturing industries, Types of production function in manufacturing, Production concept and mathematical models, Automation strategies. Cost- benefits analysis.

GROUP TECHNOLOGY

Part families, Part classification and coding, Production flow analysis, Machine cell design, Benefits of Group Technology. Industrial Robotics: Robotic programming, Robotic languages, work cell control Robot cleft design, types of robot application, Processing operations.

FLEXIBLE MANUFACTURING SYSTEM

What is FMS?, FMS work station, Material Handling and storage systems, Computer control system, Analysis methods for flexible manufacturing systems, application & benefits.



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COMPUTER INTEGRATED MANUFACTURING

What is CAD, CAM & CIMS? CIM Data base Model and Manufacturing data base. Computer aided process planning, Computer integrated Production Planning system. Brief introduction to concurrent Engineering, Rapid Prototypes and Reverse Engineering.

PROGRAMMABLE LOGIC CONTROLLERS

Parts of PLC, Operation and application of PLC, Fundamentals of Net workings. ; Computer Aided Quality Control: QC and CIM, objectives of CAQC, CMM, Flexible Inspection systems.

Text Books

1. M.P Groover, Automation, Production systems & Computer Integrated Manufacturing- PHI.
2. Boucher, T.O. Computer automation in manufacturing-an introduction, Chapman and Hall, 1996.
3. YoramKoren, Computer Control of Manufacturing Systems, McGraw Hill International, Singapore, 2006

Reference Books

1. Ray, Robots and Manufacturing Automation, John Wiley, New York, 1985.
2. Deb, S.R. Robotics technology and flexible automation, Tata McGraw-Hill, New Delhi, 1994.
3. G. Boothroyd and C. Poli, Automation Assembly, Marcel Dekkar, New York, 1982.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Lab Title: Decision Modeling Lab
Course Code: ME43121 ME
Semester: First

Core/Elective: Core
Contact Hours and Credit:

L	T	P	Credit
0	0	3	2

List of Experiments

1. Solution of Linear Programming Problem using MS-Excel and MATLAB.
2. Solution of Transportation Problem using MS-Excel and MATLAB.
3. Solution of Assignment Problem using MS-Excel and MATLAB.
4. To find out shortest path in a given network using MS-Excel and MATLAB.
5. To analyse problem through Pareto-analysis using MS-Excel.
6. Analysing a multi-criteria decision making problem through AHP Technique using MS-Excel.
7. Solution of n-step Markovian Problem using MATLAB.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Lab Title: Computer Method for Management Lab
Course Code: ME43122 ME
Semester: First

Core/Elective: Core
Contact Hours and Credit:

L	T	P	Credit
0	0	3	2

List of Experiments

1. Plotting a circle of desired radius by MATLAB.
2. Computing the multiplication of two matrices by MATLAB.
3. Compute breakeven quantity by MATLAB Programing.
4. Compute economic order Quantity by MATLAB programing.
5. Formulation program for Fibonacci series by MATLAB program.
6. Solution of network routine problem on maximum flow algorithm by MATLAB.
7. Solve a non-linear constrained problem using MATLAB optimization toolbox.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Quality Assurance
Course Code: ME43211ME
Semester: Second

Core/ Elective: Core
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES:

1. To understand the importance of quality assurance in competitive environment.
2. To have an overview of use of statistics in process control.
3. To distinguish between chance cause and assignable cause of variation in quality.
4. To understand methods of sampling inspection.
5. To understand concepts of TQM, Quality circle, ISO 9000 series of standard etc.

SYLLABUS

INTRODUCTION

Definition and Need of quality, Aspects of quality, Quality of design, Quality of conformance, Quality characteristic, Quality control and Quality Assurance, Economics of quality. Inspection, Its objectives and types, Inspection versus Quality Control, Statistical Quality Control.

Probability & Statistics: Definition, Laws, Probability Distributions (Normal Binomial, Poisson, Exponential) & related problems. Measures of Central tendency & Dispersion, Concept of Variation, Variable and attribute data, Frequency distribution.

STATISTICAL PROCESS CONTROL

Control Charts, Concept of variability, Assignable & chance causes, Concept of specifications and tolerances, Definition and objectives of control charts, Control charts for variables and attributes & related problems, Variable charts vs attribute charts, Patterns on control charts, Type-I & Type-II Errors, Process capability and its methods of determination.

ACCEPTANCE SAMPLING

Definition, Advantages over 100% inspection, Methods of taking samples, operating characteristics curve. Single, Double and Multiple sampling Sequential Sampling Plan & Related problems.



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TOTAL QUALITY MANAGEMENT

TQM principles, Customer satisfaction, voice of customer, House of quality, Quality function deployment. Description of TQM, Concept of Quality Circles, JIT System, Taguchi's Concept of Quality, Zero Defect Concept, Six sigma Concept.

QUALITY SYSTEMS

Description of ISO: 9000 series of standards, ISO: 9001–2000 Systems. Implementation of Quality systems, documentation – Quality Auditing.

RELIABILITY: Definitions of Reliability Failure, Elements of reliability. Quality vs. reliability, System Reliability & related problems. Causes of failures, Constant Failure rate, MTBF, Bath Tub Curve.

Text Books:

1. EL Grant & RS Leavenworth, "Statistical Quality Control", McGraw Hill & Co.
2. M. Mahajan, "Statistical Quality Control", Dhanpat Rai & Co.

Reference Books:

1. AmitavMitra, "Fundamentals of Quality Control", Pearson Education
2. Feigenbaum, "Total Quality Control", McGraw Hill & Co.
3. Suresh Dalela, "Quality Systems", Standard Publishers & Distributors
4. Montgomery DC, "Introduction to Statistical Quality Control", John Wiley & Sons Inc.
5. Stephan B. Vardeman, J Marcus Jobe, "Statistical QA Methods for Engineers", John Wiley & Sons Inc.
6. Taylor J.R., "Quality Control Systems", McGraw Hill Int. Education
7. K.C. Arora, "Total Quality Management", S.K. Kataria& Sons.
8. Juran on Quality by Design: The New Steps for Planning Quality into Goods and Services : J M Juran
9. Quality Control Handbook J M Juran



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Logistics and Supply Chain Management
Course Code: ME43212ME
Semester: Second

Core/ Elective: Core
Contact Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES: After studying this subject, Student will be able to:

1. Understand the nature of supply chains and trace the historical perspective, leading to their development and growth.
2. Identify the goal of a supply chain and find out the impact of supply chain decision on the success of the firm.
3. Design distribution network with strength and weakness of various distribution options of SCM.
4. Synthesize different real life cases and establish strategic fit between the supply chain strategy and the competitive strategy.

SYLLABUS

INTRODUCTION TO SUPPLY CHAIN MANAGEMENT (SCM)

Concept of Logistics Management, Concept of supply management and SCM, Component, Benefits of SCM, Core competency, Value chain, Elements of supply chain efficiency, Flow in supply chains, Key issues in supply chain management, Trends in Supply Chain, Supply Chain Planning, 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. Bullwhip Effect and Information Sharing, Push and Pull Supply Chain.

FORECASTING AND INVENTORIES IN A SUPPLY CHAIN

Forecasting and its role, characteristics of forecasts, classification, forecasting methods, Integrate demand planning and forecasting through SC.

Planning and managing inventories in SC: Goals, role, effects of cyclic inventory in SC, effect of lot size, Economic order quantity, Quantity Discount, Strategic change

SOURCING AND PROCUREMENT

Outsourcing benefit, Importance of suppliers, evaluating a potential supplier, Supplier selection, Supply contracts, Competitive bidding and Negotiation, E-procurement



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PURCHASING

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

SUPPLY CHAIN DISTRIBUTION AND LOGISTICS STRATEGY, INTEGRATION, AND RISK POOLING

Supply chain integration, Facility Sizing/Space Requirements, Warehouse Management Systems, Storage Systems, Order Fulfilment Methodologies, Material Handling Requirements, Distribution Strategies – Traditional Retail, Direct Shipping, Cross-docking, Cross-dock Operations, Distribution Strategies: Pool Distribution, Transshipment, Milk-Run Systems, Classic Techniques of Risk Management, View of (s, S) Policy, Data analysis, Pooling based on Location, Product, lead Time and capacity.

Text book:

1. Chopra, S., and Meindle, P., Supply chain Management: Strategy, Planning and Operation. Second edition, Pearson Education (singapore) Pte. Ltd, 2004
2. Simchi-Levi, D., Kaminsky, P., and Simchi-Levi, E., Designing & managing supply chain: concept, Strategies & case studies. Second Edition, Tata McGraw-Hill Edition, 2003.
3. Doebler, D.W. and Burt, D.N. Purchasing and Supply Chain Management: Text Cases, McGraw-Hill Publishing Company Limited, New Delhi, 1996.

References:

1. Tersine, R.J., Principle Of inventory And Material Management 4th Edition Prentice-hall Inc. , New Jersey, 1994.
2. Chistopher, M., Logistic And Supply Chain Management, Pitman Publishing Company, London 1993.
3. Narasimhan, S.L., McLeavy, D.W. and Billington, P.J., Production Planning and Inventory Control, 2nd Edition, Prentice-Hall India, New Delhi 1995.
4. Star, M.K. And Miller, D.W., Inventory Control: Theory and Practice, Prentice-Hall India, New Delhi 1986.
5. Raghuram, G.AndRangaraj,N., Logistic And Supply Chain Management :Cases And Concept, Macmillan India Limited, New Delhi, 2000.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Course Title: Enterprise Resource Planning (ERP) Systems
Subject Code: ME43231 ME
Semester: Second

Core/Elective: Elective
Contact Hours and Credits:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES:

At the end of the course, Student will be able:

1. To summarize conceptual model of ERP system and to discover scope and functions of ERP system.
2. To categorize ERP system and other information system to improve overall performance of an organization.
3. To evaluate / measure success of ERP system and other related systems for betterment of an organization.
4. To predict present and future of ERP system and e-commerce.

SYLLABUS

INTRODUCTION

Concept of ERP, Origin, Evolution of ERP, Conceptual Model of ERP, The Structure of ERP, Need of ERP, Advantages and Disadvantages of ERP, Functions of ERP, Overview of available ERP Packages and Tools.

ERP AND RELATED TECHNOLOGIES

Business Process Reengineering(BPR), Data ware Housing, Data Mining, Online Analytic Processing(OLAP), Product Life Cycle Management(PLM),Supply chain Management(SCM).

ERP MARKETPLACE AND MARKETPLACE DYNAMICS

Market Overview, Marketplace Dynamics, the Changing ERP Market, ERP in Indian Scenario.

ERP- FUNCTIONAL MODULES:Introduction, Functional Modules of ERP system, Integration of ERP, Supply chain and Customer Relationship Applications.

ERP IMPLEMENTATION, ERP IMPLEMENTATION LIFE CYCLE

ERP Package selection, ERP Transition Strategies, Success and Failure Factors of an ERP Implementation. Measurement of Success of ERP System and other Related Systems.



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PRESENT AND FUTURE OF ERP & E-COMMERCE

Future Directives in ERP, ERP and Internet, Future directions and Trends in ERP, ERP-Manufacturing and Managerial Perspectives. Case study using ERP tool, like SAP, ORACLE, JD Edward, BAAN etc.

TEXT BOOKS

1. Alexis Leon, “Enterprise Resource Planning”, Tata McGraw Hill.
2. Alexis Leon, “ERP Demystified”, Tata McGraw Hill.
3. Dimpishrivastava and AartiBatra, “ERP Systems”, I.K. International Publishing House.

REFERENCE BOOKS

1. Vinod Kumar Garg and N K Venkitakrishnan , “Enterprise Resource Planning – Concepts and Practice”, PHI.
2. Rahul V. Altekar “Enterprisewide Resource Planning”, Tata McGraw Hill.
3. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”, Thompson Course Technology.
4. Mary Summer, “Enterprise Resource Planning”- Pearson Education.



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DEPARTMENT OF MECHANICAL ENGINEERING
PROGRAMME: M. TECH. IN INDUSTRIAL ENGINEERING AND MANAGEMENT

COURSE TITLE: PRODUCT DEVELOPMENT & MANAGEMENT
COURSE CODE: ME43213 ME
SEMESTER: SECOND

CORE/ELECTIVE: CORE
CONTRACT HOURS AND CREDIT

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES:

The focus of Product Development and Management is integration of the marketing, development, and managerial decision of the firm in creating a new product. The course is intended to provide the following benefits:

- Competence with a set of tools and methods for product development and design.
- Confidence in the ability to create a new product.
- Awareness of the role of multiple function in creating a new product (e.g. marketing, finance, industrial design, engineering, production).
- Ability to co-ordinate multiple interdisciplinary task in order to achieve a common objective.
- Enhanced team working skills.

SYLLABUS

DEVELOPING PRODUCT

Need for Developing Product, Concept Generation, Key Concept In Innovation, Thinking For Innovation, And Various Element Of The Innovation Cycle, Ideation Involving User Interaction, Need Identification And Co-Creation, Triz: Theory Of Inventive Problem Solving, Assessment Of Potential Of Technology For Success, Producer To User Innovation. "Lead User" Innovation Communities and Innovators, Toolkit to Support Product Development by Customers, Tools and trends in product development.

EVALUATION

Demand Forecasting, Decision Making and Concept Selection, Evaluation Methods

ECONOMIC DECISION MAKING:

Mathematics of Time Value of Money, Cost Comparison, Depreciation Texas Profitability of Investments, Other Aspects of Profitability, Inflation Sensitivity and Break Even Analysis.



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UNDERSTANDING MARKETING MANAGEMENT:

Capturing Marketing Inside, Connecting with Customers, Creating Brand, Setting Product Strategy and Managing Services, Delivering and Communicating Value, Creating Long term Growth.

PROTOTYPING

Familiarization of solid modelling techniques and software. Basic principle of rapid prototyping processes. Industrial RP system, Role of Rapid Prototyping and Rapid Tooling in Product Development and Simultaneous Engineering. Introduction to reverse engineering, Integration of Reverse Engineering and Rapid prototyping, Application and use of Reverse Engineering in Product Development.

Text books

1. Dieter G.E., Schmid L.C., Engineering Design, Fourth Edition, The McGraw-Hill Companies, Inc., 2009.
2. Chua, C.K., Leong, K.F., Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley and Sons Inc., 2000.
3. Pham, D.T., Demov, S.S., Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, Springer-Verlag London Limited, 2001.
4. Kotler P., Keller K. L., Marketing Management, Pearson Education, Inc., 2012.

Reference book

1. Ulrich, Karl, and Steven Eppinger. *Product Design and Development*. 3rd ed. New York, NY: McGraw-Hill, 2004.
2. Thomke, Stefan, and Ashok Nimgade. "IDEO Product Development." Boston, MA: Harvard Business School Case 9-600-143, June 22, 2000.
3. Bowen, H. Kent, and Thomas Everett. "SweetWater." Boston, MA: Harvard Business School Case 9-695-026, November 1, 1994.



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Department of Mechanical Engineering Programme: M. Tech. in Industrial Engineering and Management

Course Title: Management and Productivity
Course Code: ME43115 ME
Semester: Second

Core/Elective: Core
Contract Hours and Credit:

L	T	P	Credit
3	1	0	4

COURSE OUTCOMES: The focus of Management and Productivity is Improve personal skills in managing workload & conflicting priorities. Develop a structured & systematic approach to productivity bottlenecks & learn practical techniques to streamline & reach your productive peak. At the end of the course student will able to:

- Described the core features of the management and productivity management function at the managerial and strategic levels, specifically the relationships between people, process, technology, productivity and quality and how it contributes to the competitiveness of firms.
- Explain the various parts of the management and productivity processes and their interaction with other business functions (strategy, engineering, finance, marketing, HRM, project management and innovation)
- Apply and analyze the value analysis (VA), value engineering (VE) and business process reengineering (BPR) to enhance the productivity radically.

SYLLABUS

INTRODUCTION

Concept, features, natures and importance of management, principles of scientific management, effective management. Productivity concepts-Macro and Micro factors of productivity, productivity benefit model, productivity cycles.

FUNCTIONS OF MANAGEMENT

Concept of planning and its types, objective and strategy related to planning. Concept of organizing and forms of organization structure. Concept of staffing recruitment, selection, training and development. Motivation theory and applications, leadership. Controlling and its techniques.

VALUE ANALYSIS AND VALUE ENGINEERING

Concept-procedure-application and role in productivity. Productivity models: Productivity measurement at International, National and organization level, total productivity models. Productivity management in manufacturing and service sector.



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BUSINESS PROCESS REENGINEERING

Concept of BPR, process of BPR, prerequisites for effective BPR implementation, application of BPR in productivity improvement. Case study related to BPR application.

SYSTEM IMPROVES PRODUCTIVITY THROUGH QUALITY

Quality and productivity, total quality control and quality management; effective human resources management: management of people, role of management, workers participation, productivity training.

Text Books

1. Productivity engineering and management – Sumanth, D.J. – Tata McGraw-Hill, New Delhi 1990.
2. Handbook for Productivity Measurement and Improvement - Carl G. Thor - Productivity Press.
3. Ralph M. Barnes, “Motion and Time Study”, Johan wiley and sons, 1990.
4. Principles and Practice of Management- L M Prasad, Sultan Chand & Sons

Reference Books

1. Productivity management, a practical Handbook, JoseohProkopenko, International Labour office, 1987.
2. Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity and Competitiveness – H. James Harrington - McGraw-Hill
3. Re-engineering and re-inventing the enterprise – Rastogi, P.N.,-Wheelerpublications, New Delhi 1995.
4. Productivity Management-Systems approach-Premvrat, Sardana, G.D. and Sahay, B.S.-Narosa Publications, New Delhi, 1998.



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Department of Mechanical Engineering
Programme: M. Tech. in Industrial Engineering and Management

Lab Title: *Project on Product Development*
Course Code: *ME432126ME*
Semester: *Second*

Core/Elective: *Core*

Contract Hours and Credit:

L	T	P	Credit
0	0	3	2

A case study approach

Central to this lab class is a team-based learning approach to conceive and develop product/service ideas, by carrying out following procedure:

1. Opportunity Identification: Identification of appropriate project proposals and development of promising opportunities.
2. Product Planning: Demonstration of opportunity (need) for the selected product/service.
3. Identifying Customer Needs: Interpreting data in terms of customer needs and establishment of relative importance of needs.
4. Concept Generation: Clarification of concept, search and exploration of concept.
5. Concept Selection: Concept screening and scoring.
6. Prototyping: Planning and testing.
7. Product Development Economics: Evaluation of capital decision for the selected product/service launch.
8. Result and Discussion: A verbal or visual demonstration of the selected product/service.