



Rajiv Gandhi Institute of Technology

(Govt. Engineering College ,Kottayam)



**WHO?
CAN APPLY?**

B.Tech/BE degree in any engineering stream

Department of Mechanical Engineering

M. Tech
Industrial Engineering
and Management

Intake
Seats **18**



Course Highlights

The programme lays emphasis on Supply Chain Management, Work System Design, Quality Management, Quantitative techniques, Financial Management, Business Practice, and Industrial Economics, and enables students to build domain expertise in the area of their choice through a wide variety of electives offered in the programme.



Lab Facilities

Industrial Engg Lab Ergonomics Lab
CAD Lab Fab Lab



Software and Equipment

SPSS, AMOS, Witness, Primavera, CATIA, JACK, Driving Simulator, Motion System, Dynamometers, Environment measurement instruments.

About the course

M.Tech in Industrial Engineering and Management (IEM) at RIT is an interdisciplinary course that trains students to become highly skilled professionals in the area of industrial engineering and allied fields. The course offers a blend of theory, modeling, and application with a systems view derived from long-standing principles of industrial engineering. The course equips the students to analyze, solve engineering and management problems effectively through their decision making skills.

An IEM Student learns to deal with practical problems in industry and business through industrial training, mini projects and main projects designed in the programme. They have the opportunity to network with IIIE, SAE, ISTE, IEEE and Innovations@RIT in the campus for their professional development. Our alumni work in key positions in a wide spectrum of industries, academia, and research such as MRF, Kitex, Amazon, Cochin Shipyard, ISRO, Entuple, Terumo Penpol, Canara Bank, Federal Bank, Atlantis Foundries, SFO Technologies, Abudhabi Ports etc.

Are you excited about a career in solving industrial problems, improving organizational performance and adding value to the Industry? If so, M.Tech in IEM at RIT is the right choice for you.

Faculty

With 15+ years of experience with specialized domain expertise

WWW.RIT.AC.IN

PG coordinator

rajesh@rit.ac.in ✉

9446073919 📞

hod.me@rit.ac.in ✉

9447422303 📞

Pampady, Kottayam 🏠

APJ Abdul Kalam Technological University

Cluster 4: Kottayam

M. Tech Program in
Mechanical Engineering
(Industrial Engineering & Management)

Scheme of Instruction and Syllabus: 2



Compiled By

Rajiv Gandhi Institute of Technology, Kottayam

July 2015



**APJ Abdul Kalam Technological University
(Kottayam Cluster)**

M. Tech Program in Industrial Engineering and Management

Scheme

Credit requirements : 66 credits (22+18+14+12)
 Normal Duration : Regular: 4 semesters; External Registration: 6 semesters;
 Maximum duration : Regular: 6 semesters; External Registration: 7 semesters.
 Courses: Core Courses: Either 4 or 3 credit courses; Elective courses: All of 3 credits

Allotment of credits and examination scheme:-

ELIGIBILITY: B. Tech/B.E in any branch of engineering with a minimum of 60 % Marks.

SEMESTER-1

| Exam Slot | COURSE No.: | Name | L- T - P | Internal Marks | End Sem. Exam | | Credits (22) |
|-----------|-------------|--|----------|----------------|---------------|-----|--------------|
| | | | | | Marks | Hrs | |
| A | 04 ME 6101 | Business Mathematics | 3-1-0 | 40 | 60 | 3 | 4 |
| B | 04 ME 6103 | Business Practice and Industrial Economics | 3-1-0 | 40 | 60 | 3 | 4 |
| C | 04 ME 6105 | Materials & Supply Chain Management | 3-0-0 | 40 | 60 | 3 | 3 |
| D | 04 ME 6107 | Work System Design | 3-0-0 | 40 | 60 | 3 | 3 |
| E | 04 ME 61XX | Elective - I | 3-0-0 | 40 | 60 | 3 | 3 |
| | 04 GN 6001 | Research Methodology | 0-2-0 | 100 | 0 | 0 | 2 |
| | 04 ME 6191 | Seminar – I | 0-0-2 | 100 | 0 | 0 | 2 |
| | 04 ME 6193 | Industrial Engineering Lab | 0-0-2 | 100 | 0 | 0 | 1 |
| | | Total | 23 | | | | 22 |

List of Elective –I Courses:

| Exam Slot | Course No. | COURSE NAME |
|-----------|------------|--|
| E | 04 ME 6109 | Marketing and Consumer Behaviour |
| E | 04 ME 6111 | Marketing Logistics |
| E | 04 ME 6113 | Safety and Environment Management System |
| E | 04 ME 6115 | Organizational Behaviour |

**SEMESTER-2**

| Exam Slot | Course No: | Name | L- T - P | Internal Marks | End Sem. Exam | | Credits (18) |
|-----------|------------|-------------------------------------|----------|----------------|---------------|-----|--------------|
| | | | | | Marks | hrs | |
| A | 04 ME 6102 | Quantitative Techniques | 3-0-0 | 40 | 60 | 3 | 3 |
| B | 04 ME 6104 | Quality Management | 3-0-0 | 40 | 60 | 3 | 3 |
| C | 04 ME 6106 | Financial Management and Accounting | 3-0-0 | 40 | 60 | 3 | 3 |
| D | 04 ME 61XX | Elective -II | 3-0-0 | 40 | 60 | 3 | 3 |
| E | 04 ME 61XX | Elective -III | 3-0-0 | 40 | 60 | 3 | 3 |
| | 04 ME 6192 | Mini Project | 0-0-4 | 100 | 0 | 0 | 2 |
| | 04 ME 6194 | Software Lab | 0-0-2 | 100 | 0 | 0 | 1 |
| | | Total | 21 | | | | 18 |

List of Elective –II Courses

| Exam Slot | COURSE No. | COURSE NAME |
|-----------|------------|-----------------------------------|
| D | 04 ME 6108 | Soft Computing Techniques |
| D | 04 ME 6112 | Plant Engineering and Maintenance |
| D | 04 ME 6114 | Practical Project Management |
| D | 04 ME 6116 | Industrial Scheduling |

List of Elective –III Courses

| Exam Slot | COURSE No. | COURSE NAME |
|-----------|------------|---|
| E | 04 ME 6118 | Reliability Engineering And Management |
| E | 04 ME 6122 | Business Communication and Report writing |
| E | 04 ME 6124 | Total Quality Management |
| E | 04 ME 6126 | Management Information System |

SUMMER BREAK

| Exam Slot | Course No: | Name | L- T - P | Internal Marks | End Sem. Exam | | Credits (0) |
|-----------|------------|---------------------|----------|----------------|---------------|-----|---------------|
| | | | | | Marks | hrs | |
| NA | 04 ME 7190 | Industrial Training | 0-0-4 | | | | Pass/ Fail |



SEMESTER-3

| Exam Slot | Course No: | Name | L- T - P | Internal Marks | End Sem. Exam | | Credits (14) |
|-----------|------------|-------------------|----------|----------------|---------------|-----|--------------|
| | | | | | Marks | hrs | |
| A | 04 ME 71XX | Elective 4 | 3-0-0 | 40 | 60 | 3 | 3 |
| B | 04 ME 71XX | Elective 5 | 3-0-0 | 40 | 60 | 3 | 3 |
| NA | 04 ME 7191 | Seminar-II | 0-0-2 | 100 | 0 | 0 | 2 |
| NA | 04 ME 7193 | Project (Phase 1) | 0-0-12* | 50 | 0 | 0 | 6 |
| | | Total | 20 | | | | 14 |

List of Elective-IV Courses:

| Exam Slot | COURSE No. | COURSE NAME |
|-----------|------------|------------------------------------|
| A | 04 ME 7101 | System Modelling and Simulation |
| A | 04 ME 7103 | Modern Manufacturing System Design |
| A | 04 ME 7105 | Human Resource Management |
| A | 04 ME 7107 | Industrial Ergonomics |

List of Elective-V Courses:

| Exam Slot | COURSE No. | COURSE NAME |
|-----------|------------|---------------------------------|
| B | 04 ME 7109 | Knowledge Management |
| B | 04 ME 7111 | Industrial Relations |
| B | 04 ME 7113 | Integrated Materials Management |
| B | 04 ME 7115 | Heuristics of Decision Making |

SEMESTER-4

| Exam Slot | Course No: | Name | L- T - P | Internal Marks | External Evaluation | Credits (12) |
|-----------|------------|-------------------|----------|----------------|---------------------|--------------|
| | | | | | Marks | |
| NA | 04 ME 7194 | Project (Phase 2) | 0-0-21 | 70 | 30 | 12 |

Total: 66 Credits



SEMESTER I

| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|----------------------|---------|------|
| 04 ME 6101 | Business Mathematics | 3-1-0:4 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To know mathematical methods for solving linear equation.
2. To model industrial problems statistically.

Syllabus

Rank of matrix, Standard distribution, Standard normal, Standard normal tables .Testing of hypothesis, large and small sample test, non-parametric test, analysis of variance, Curve Fitting, Bivariate Linear Correlation.

Course Outcome:

At the end of the course the students must be able to:

1. Solve a system of linear equations
2. Can identify the behavioural pattern of a numerical data and study its properties using probability distribution
3. Apply statistical test procedure in industrial/ management area
4. Identify the degree of relationship between two variables and find the best fitting lines.

Text Books:

1. Gupta, S.C., and Kapoor, V.K. (2011). Fundamentals of Mathematical Statistics. Sultan Chand and Sons.
2. Katta G. Murty, ``Optimization for Decision Making: Linear and Quadratic Models'', Springer, 2010

References:

1. Richard Johnson, R.A. (2011): Miller and Freunds Probability and Statistics for Engineers, 8th edition. Prentice Hall India.
2. Md. Ehsanes Saleh, A.K., and Rohatgi, V.K. (2008). An Introduction to Probability Theory and Mathematical Statistics, 2nd edition. Wiley India.
3. Mann, P.S. (2012). Introductory Statistics, 7th edition. Wiley India.
4. Grewal, B.S. (2012). Higher Engineering Mathematics, 42nd edition. Khanna Publishers.



COURSE PLAN

| COURSE CODE | COURSE TITLE | CREDITS | |
|---|-----------------------------|----------------|-------------------|
| 04 ME 6101 | BUSINESS MATHEMATICS | 3-1-0:4 | |
| MODULES | | Contact Hours | Sem. Exam Marks;% |
| MODULE 1: Rank of a matrix, elementary transformations, Normal form of a matrix, Echelon form of a matrix. Consistent system of linear equations, Gauss-Jordan (GJ) and Gaussian (G) elimination methods. Solution of system of homogenous and non-homogenous linear equation | | 9 | 15 |
| MODULE 2: Probability distribution- Standard Distribution – Uniform: Geometric Binomial; Poisson; Exponential; Fitting of Distributions (Binomial and Poisson). Properties – Mean, Variance | | 9 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Normal distribution – definitions, Simple Properties and applications, Use of Standard Normal Tables for Computation of Various Probabilities. Testing of hypothesis- Statistical hypothesis, Simple and composite hypothesis Null and Alternate hypothesis, Type I and Type II errors, Critical Region, Size of the test, P value. Large Sample test – Z test, Chi-Square test for goodness of fit. | | 9 | 15 |
| MODULE 4: Small sample tests – t test, Chi-square test for variance, F test, Tests of Correlation and Regression. Analysis of Variance (one way classification) | | 9 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Non parametric tests (All tests as techniques only). Basic ideas, sign test for one sample and two sample cases, signed rank tests for one sample and two sample cases, run test for randomness. | | 10 | 20 |
| MODULE 6: Curve Fitting: Principle of Least Squares, Fitting of Straight Lines, Parabolas, Exponential Curves. Bivariate Linear Correlation – Scatter Diagram Pearsons Correlation Coefficient, Spearman’s Rank Correlation Coefficient. Bivariate Linear Regression – Regression Lines, Coefficients of Regression. | | 10 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--|---------|------|
| 04 ME 6103 | Business Practice and Industrial Economics | 3-1-0:4 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To introduce the concepts of economics relevant to business and industry to the students.
2. To make the students understand the importance of leadership, motivation and teamwork in the management perspective.
3. To introduce the concept of cost accounting and its methods.

Syllabus

Introduction to management, authority, organizing, human resource management, leading, definition of managerial economics, cost considerations, principles of capital budgeting.

Course Outcome:

The student will understand the concepts of economics necessary in an Industrial organisation and will be able to take decisions based on break even analysis, capital budgeting etc.

Text Books:

1. Gupta, G. (2011). Managerial Economics. Tata McGraw-Hill.
2. Luthans, F. (2013). Organizational Behavior. Tata McGraw-Hill

References:

1. Koontz, H., and Weihrich, H. (2004). Principles of Management. Tata McGraw-Hill.
2. Stoner, J.A.F., Robbins, S.P., Hitt, M.A., Manjunath, V.S., and SatyaRaju, R. (2010). Principles of Management, 2nd edition. Pearson Education.
3. Bhattacharyya, D.K. (2012). Principles of Management: Text and Cases, 1st edition. Pearson Education.
4. Andreosso, B., and David Jacobson, D. (2005). Industrial Economics and Organisation. Tata McGraw-Hill.
5. Horngren, C.T. (2012). Cost Accounting: A Managerial Emphasis, 14th edition. Pearson Education.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|---|----------------------|-------------------------|
| 04 ME 6103 | BUSINESS PRACTICE AND INDUSTRIAL ECONOMICS | 3-1-0:4 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to Management, Organization Structure, Industrial Politics | | 9 | 15 |
| MODULE 2: Authority-Responsibility and Accountability, Span of Control & Delegation of Power, Functions of Management, SWOT analysis. Organizing - Organizational Design & Structure | | 9 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Human Resource Management, Managing Organizational Change & Innovation. Leading – Motivation and Leadership, Teams & Team work, Communication & Negotiation, Controlling | | 9 | 15 |
| MODULE 4: Definition of Managerial Economics, Decision making and the fundamental concepts affecting business decisions. Utility Analysis & Demand Curve, Demand Forecasting | | 9 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Cost Considerations, Break-Even Analysis and its application, Cost output relationship | | 10 | 20 |
| MODULE 6: Principles of Capital Budgeting, Cost of Capital, Market Structure, Pricing and Output, Pricing Methods. | | 10 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|---------------------------------------|---------|------|
| 04 ME 6105 | Materials and Supply Chain Management | 3-0-0:3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To introduce the basic concepts, functions and importance of supply chain management
2. To impart knowledge relating to inventory management
3. To provide fundamental information pertaining to decision support tools for supply chain Management.
4. To understand how to measure supply chain performance

Syllabus

Introduction to SCM. Supply chain concept and characteristics. Planning demand and supply. Procurement and inventory decision making. Inventories in the organization. Documentation for transport. Supply chain and Logistic Information system

Course Outcome:

1. The student will understand the concept of supply chain management ,inventory management and will be able to solve problems involving forecasting and Inventory control
2. The student will be able to understand and solve problems involving transportation of materials
3. The student will be able measure the performance of a supply chain.

Text Books:

1. Sunil Chopra., Supply Chain Management, Strategy, Planning & Operation, Pearson
2. Shapiro, J. (2006). Modeling and Supply Chain. South Western.
3. Mohanty, R.P., and Deshmukh, S.G.(2001). Essentials of Supply Chain Management, Phoenix Publishing House Pvt. Ltd

References:

1. Burt D., Dobler, D., and Starling, S. (2002). World Class Supply Management. Tata McGraw Hill.
2. Bondi C., and Langely. The management of Business Logistics a Supply Chain Perspective. Thomson South Western.
3. Boversox, D., and David, C. (2002). Logistics Management. Tata McGraw Hill.
4. Bloomberg, D. J., Lemay, S., and Hanna, J B. (2004).Logistics, PHI Learning



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|---------------------------------------|---------------|------------------|
| 04 ME 6105 | MATERIALS AND SUPPLY CHAIN MANAGEMENT | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to SCM - Understanding the Supply Chain- The changing business landscapes driving forces. Supply Chain concepts and characteristics-Discussions of logistics interface with micro economy such as marketing, production and other functional areas and macro economy such as global economic policies | | 7 | 15 |
| MODULE 2: Planning Demand and Supply -Demand Forecasting- Role of Aggregate Planning- Planning Strategies, MRP, ERP, DRP- Managing predictable variability | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Procurement and Inventory Decision Making - Inbound logistics along the Supply Chain- Material management: - Procurement and importance of item and service purchased- Documentation in Purchase, Significance of inventories in broader perspective. Inventories in the organization- rationale for inventory- Classifying inventory- Approaches to managing inventories under conditions of certainty and uncertainty | | 7 | 15 |
| MODULE 4: Inventory at multiple locations and determining optimal level of inventory-Problems in Inventory Management. Documentation for Transport, Basic Modes of transportation- Classification of carriers- Management Strategy for carrier shipments- Network design. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Supply Chain and Logistics Information System - Use of Information in a supply chain- Information system building process and role of E- business in a supply chain- Positioning information in logistics-Methods Obstacles to co-ordination in a supply chain | | 7 | 20 |
| MODULE 6: Performance Measurement System in Supply Chain - Current issues in performance measurement and reporting; monitoring, controlling and directing- Challenges for future; cycle reduction strategies, Inventory reduction strategies and E-Commerce strategies. Managing International Supply Chain | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------------|---------|------|
| 04 ME 6107 | Work System Design | 3-0-0:3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To introduce the foundational concepts of Industrial Engineering to the students
2. To understand the fundamental concepts in Motion and Time Study, Design and measurement of Work and ergonomics.
3. To introduce the concept of the Methods, Measurement and Management of Work
4. To impart knowledge on concepts of ergonomics and anthropometric design

Syllabus

Work study fundamentals. Method study. Micro motion study. Work measurement. Job evaluation. Ergonomics fundamentals. Anthropometric principles. Physiology. Design of Physical environment.

Course Outcome:

The student will demonstrate the ability to understand and solve problems involving Methods, Standards, work design, Concepts of Ergonomics and Time and Motion Study.

Text Books:

1. Barnes, R. M. (1980). Motion and Time Study: Design and Measurement of Work. Wiley & Sons.

References:

1. Barnes, R. M. (1980). Motion and Time Study: Design and Measurement of Work. Wiley & Sons.
2. Niebel, W. B., and Freivalds, A. (2004). Methods, Standards, and Work Design. McGraw Hill.
3. Groover, M.P. (2007). Work Systems: The Methods, Measurement and Management of Work, 1st edition. Prentice Hall.
4. Tayyari, F., and Smith, J. L. (2003). Occupational Ergonomics - Principles and Applications. Kluwer Academic Publishers.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|---------------------------|----------------------|-------------------------|
| 04 ME 6107 | WORK SYSTEM DESIGN | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Work Study Fundamentals - Productivity, Definition and scope of Motion and Time Study, Reducing Work Content and ineffective time. Method Study - Basic procedure, Process analysis, Activity charts, Man-Machine charts, Operation analysis | | 7 | 15 |
| MODULE 2: Micro motion study, Principles of motion economy, Use of films in Method and Motion Analysis. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Job Evaluation - Basic concepts, Different methods and their use, Compensation Schemes and wage incentive plans. Work Measurement - Purposes and uses, Basic procedure, Work sampling, Stop-watch time study, Concepts of rating and allowances, Setting standard times for jobs, Standard data, Predetermined Time Standards. | | 7 | 15 |
| MODULE 4: Ergonomics Fundamentals - Simple and complex worksystems, Ergonomic aspects in workstation design and analysis Anthropometric Principles and Postural Analysis in Workspace Design - Anthropometry and its uses, applications of anthropometry in design, postures and body mechanics, musculoskeletal problems in sitting and standing. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Physiology, Workload, and Work Capacity - Physical work capacity, factors affecting work capacity, measurement of physiological cost of work, fitness for work | | 7 | 20 |
| MODULE 6: Design of Physical Environment - Human thermoregulation, measuring thermal environment, measurement of light, lighting design considerations, measurement of sound/ industrial noise and its control, vibration, principles for the design of visual displays and control, work organization and work system design. Human sensory system, Cognitive load and design principles for cognitive load. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|----------------------------------|---------|------|
| 04 ME 6109 | Marketing and Consumer Behaviour | 3-0-0:3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand consumers and role of marketing in modern business context.
2. To familiarize the tools of solving present day marketing problems.
3. Effectively link marketing strategies for the optimal utilization of market mix.

Syllabus

Marketing, Concepts and classification of products, Role of the internet, Marketing management process, Marketmix, Consumerbehaviour, Indian consumer profile.

Course Outcome:

After studying this course the student will be able to understand the given marketing situation and to propose appropriate marketing strategy to deal with marketing goals/objectives

Text Books:

1. Kotler, P., and Keller, K. L. (2004). A Framework for Marketing Management, 4th edition. Pearson Education India.

References:

1. Kotler, P. (2013). Rethinking Marketing, 2nd edition. Pearson Education.
2. Kumar, S.R. (2012). Case Studies in Marketing Management, 1st edition. Pearson Education India.
2. Kotler, P., Armstrong, G., Agnihotri, P.Y., and ulHaque, E. (2010). Principles of Marketing: A South Asian Perspective, 13th edition. Pearson Education India.
3. Anand, V.P. Marketing Management: An Indian Perspective. Wiley India.
4. Kumar, S.R. (2004). Consumer Behaviour and Branding: Concepts, Readings and Cases - The Indian Context, 1st edition. Pearson Education India



COURSE PLAN

| COURSE NO. | COURSE TITLE: | CREDITS | |
|---|---|----------------|------------------|
| 04 ME 6109 | MARKETING AND CONSUMER BEHAVIOUR | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Marketing - Definition, Marketing concepts - present and emerging. Market mix and Product mix. Concepts and classifications of products, services, needs, wants and demands. Societal, integrated, mega and micro marketing | | 7 | 15 |
| MODULE 2: Role of the internet. Marketing of services, Governmental and private marketing. Latest trends in Indian marketing environment. Marketing management process: Marketing goals, objectives and strategies. Classification of marketing strategies | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Marketing strategies for growth and emerging markets. Strategies for mature and stable markets. Requirements for global, international and transnational competencies. Functioning of different types of marketing organizations | | 7 | 15 |
| MODULE 4: Market mix: Product life cycle strategies, Branding - Brand equity - Packaging - marketing activities connected with product development and launching - Test marketing' Price, satisfaction, delight and value. Pricing strategies. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Methods for promoting the products and services. Service channels and marketing logistics. Consumer behavior - Definition. Determinants of consumer behaviour. Psychological, social, demographic and cultural factors. Types and stages of buyer decision behaviour. Models of consumer behaviour. Role of gate keepers and influencers. Application of market research in consumer behaviour. Domestic versus industrial purchases. | | 7 | 20 |
| MODULE 6: Indian consumer profile. Market segmentation- definition-difference between market segmentation and product differentiation. Bases of segmentation. Characteristic features of market segments. Service segmentation. Functional and non-functional aspects of segmentation. Product proliferation. Application of market research in segmentation. Limiting features of market segmentation. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|---------------------|---------|------|
| 04 ME 6111 | Marketing Logistics | 3-0-0:3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the fundamental concepts, theories and methods in marketing Logistics.
2. To understand how the logistics management is done in industry

Syllabus

Supply chain management and logistic.Functions of the logistic system.Customer relationship.Retailing and wholesaling.Direct online marketing.Transportation alternatives and technologies.Logistic in different industries.Transportationalternaives .Logistic in different industries

Course Outcome:

The student will understand how logistics management is being done in industry and will be in a position to develop logistic plans for synergistic growth and sustenance of a business

Text Books:

1. Langford, J. (2007). Logistics: Principles and Applications, 2nd edition. Tata McGraw-Hill.

References:

1. Bloomberg, D. J., LeMay, S.B., and Hanna, J.B. (2002). Logistics. Prentice Hall.
2. Teufel, T., Rohricht, J., and Williams, P. (2002). SAP Processes: Logistics. Addison-Wesley.
3. Blanchard, B.S. (2004).Logistics Engineering & Management, 6th edition. Prentice Hall.
4. Ballou, R.H., Srivastava, S.K. (2007). Business Logistics/Supply Chain Management. Pearson Education India.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|---------------------|---------------|-----------------|
| 04 ME 6111 | MARKETING LOGISTICS | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam arks;% |
| MODULE 1: Supply chain management and logistics - Introduction, Objectives and Scope. Physical distribution management. Functions of the logistics system - Transportation, Warehousing, Order processing, Information handling and procurement. | | 7 | 15 |
| MODULE 2: Customer relationship management. Marketing mix - Product, Product life cycle, Product line, Product mix strategies. Importance of marketing logistics system - Goals, Integrated logistics management, Major logistics functions, Role of RFID. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Marketing channels and Supply chain management - Vertical marketing system, Horizontal marketing system, Multi-channel distribution system. Channel design decisions, Channel management decisions | | 7 | 15 |
| MODULE 4: Retailing and Wholesaling - Marketing decisions for Retailing and Wholesaling. Types of wholesalers, Trends in wholesaling. Direct and online marketing – Types promises and challenges | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Transportation alternatives and technologies - Transportation performance analysis, Transportation cost analysis, Fleet development and management, Fleet performance indicators, Routing and scheduling, Shipment planning, Vehicle loading, Transportation management and information systems requirements | | 7 | 20 |
| MODULE 6: Logistics in different industries - Third party and Fourth party logistics, Reverse logistics, Airline Schedule Planning, Railway Networks, Postal services, Logistics in maritime industry / health care and other service industries | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-----------------------------------|---------|------|
| 04 ME 6113 | Safety and Environment Management | 3-0-0:3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the fundamental concepts, theories and methods in Safety and Environment Management System
2. To introduce the purpose of learning important subjects in Safety and Environment Management System for meeting the requirement of various professional field applications.

Syllabus

Safety system.definitions of accidents.Hazardanalysis.managing for safety.Workpermit and lock out system.safety in material handlingFire protection system.SuppressionsystemSafety in process.Safety in foundry.Safety legislation.

Course Outcome:

The student will understand the safety management as practiced in industry and knows the concepts of Environment Impact Assessment.

Text Books:

1. Ridley, J., and Channing, J. (2008). Safety at Work. Butterworth-Heinemann UK.
2. Deshmukh, L.M. (2005). Industrial Safety Management. Tata McGraw-Hill.

References:

1. Nicholas, P.C. (2000). Practical Guide to Industrial Safety: Methods for Process Safety Professionals. Marcel Dekker.
2. National Safety Council. (2000). Accident Prevention Manual: Engineering & Technology, 12th edition. National Safety Council.
3. Macdonald, D. (2004). Practical Industrial Safety, Risk Assessment and Shutdown Systems, 1stedition.Newnes (Elsevier).
4. Ridley, J., and Channing, J. (2008). Safety at Work. Butterworth-Heinemann UK.
5. Center for the Advancement of Process Tech. (2004). Safety, Health and Environment. Prentice Hall.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|---|----------------|------------------|
| 04 ME 6113 | SAFETY AND ENVIRONMENT MANAGEMENT SYSTEM | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Safety Systems - Definition, Safety information system - Basic concepts. Definition of accidents, Analysis of causes of accident. Hazard analysis - General hazard analysis, Analysis of electrical, physical and chemical hazards. Cost effectiveness in hazard eliminations, Fault Tree Analysis and HAZOP studies. | | 7 | 15 |
| MODULE 2: Managing for Safety - Safety inspection, procedure, periodicity, checklist, report forms. Planning for safety and productivity, Safety sampling, Safety audit, Safety survey, JSA, Accident prevention. Work permit and lock out system, Accident analysis, Safety education and communication, Safety performance analysis. Personal protective equipment testing and usage | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Safety in Material Handling: Selection of material handling equipment. Equipment used - ropes, chains, slings, hooks, clamps. Procedure for testing and checking as per standard. Design conservation, conveyor systems, belt, roller chain and elevator and lifts, industrial hoists, mobile crane, forklift, operation maintenance and checking procedure. | | 7 | 15 |
| MODULE 4: Fire Protection System - Automated fire fighting system, chemistry of fire, water sprinkler, fire hydrant, alarm and detection system. Suppression system, CO2 system, Foam system, DCP system, Halon system, Portable extinguisher. Suppression system, CO2 system, Foam system, DCP system, Halon system, Portable extinguisher | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Safety in Process: Design for safety, safety in use of power press. Safety in foundry, forging, welding, hot working and cold working, electroplating and boiler operation. Safety Legislation: Provisions in factory act for safety, explosive act, workmen compensation act, compensation calculation. Boiler act and pollution control act, electrical safety, electricity act and rules | | 7 | 20 |
| MODULE 6: Environment Impact Assessment (EIA): Introduction, EIA capability and limitations, Legal provisions on EIA, Methods of EIA – checklists, matrices, Networks. Cost benefit analysis, Analysis of alternatives. Case studies. Adverse impact on environment. ISO14001:2004 EMS standards | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------------------|---------|------|
| 04 ME 6115 | ORGANIZATIONAL BEHAVIOUR | 3-0-0:3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the fundamental concepts, theories and methods in Organizational Behavior.
2. An ability to apply these concepts to understand the sociological, managerial and psychological factors that underpin organisational behaviour
3. A critical understanding of the factors that shape and change organisational structures
4. An understanding of inter-organisational relationships and networks

Syllabus

The organizational basis for behaviour. perception and learning. role analysis and inter personal dynamics. interpersonal interactions. Personality, work group behaviour and productivity. oraganizational development. Transaction analysis.

Course Outcome:

1. The student will understand how behavioral factors affect organizations.
2. The student will be able to apply theories to practical problems in a critical manner for analyzing organizational issues for solving them

Text Books:

1. Dick, P., and Ellis, S. (2005). Introduction to Organisational Behaviour. McGraw-Hill.
2. Luthans, F. (2013). Organizational Behavior. Tata McGraw-Hill.

References:

1. Mullins, L. (2007). Management & Organizational Behaviour, 7th edition. Pearson Education India.
2. Brooks, I. (2004). Organizational Behaviour: Individuals, Groups and Organization. Prentice Hall.
3. Sodhi, J., and Saiyadain, M. (2004). Cases in Organizational Behaviour& Human Resource Management. Tata McGraw-Hill.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|--------------------------|---------------|------------------|
| 04 ME 6115 | ORGANIZATIONAL BEHAVIOUR | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: The Organizational basics for behaviour, Systems approach to organization. Organizational structure, Making Organizing effective. Organizational culture | | 7 | 15 |
| MODULE 2: Perception and learning, Theories of learning, Motivation theories. Role analysis and Inter personal Dynamics, Assumptions, perceptions and feelings. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Interpersonal interactions, activities and sentiments – Interpersonal communication – Problems in role effectiveness | | 7 | 15 |
| MODULE 4: Personality – Theories – effects on behaviour. Group Dynamics and Inter-group relationships, Characteristics of work group. Basic forces that shape group behaviour Dynamics of effective operating groups. Work group behaviour and productivity. Team Management. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Organizational Development - Styles and skills in leadership and communication – Power and politics in organization - Managing differences and conflicts – Managing change – Organisation and society. | | 7 | 20 |
| MODULE 6: Grid Management, Transactional Analysis – Sensitivity Training – Process consultancy. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P-C | YEAR |
|------------|----------------------|---------|------|
| 04 GN 6001 | RESEARCH METHODOLOGY | 0-2-0:2 | 2015 |

Pre-requisites:

Course Objectives:

To enable the students:

- To get introduced to research philosophy and processes in general.
- To formulate the research problem and prepare research plan
- To apply various numerical /quantitative techniques for data analysis
- To communicate the research findings effectively

Syllabus

Introduction to the Concepts of Research Methodology, Research Proposals, Research Design, Data Collection and Analysis, Quantitative Techniques and Mathematical Modeling, Report Writing.

Course Outcome:

Students who successfully complete this course would learn the fundamental concepts of Research Methodology, apply the basic aspects of the Research methodology to formulate a research problem and its plan. They would also be able to deploy numerical/quantitative techniques for data analysis. They would be equipped with good technical writing and presentation skills.

Text Books:

1. Research Methodology: Methods and Techniques', by Dr. C. R. Kothari, New Age International Publisher, 2004
2. Research Methodology: A Step by Step Guide for Beginners' by Ranjit Kumar, SAGE Publications Ltd; Third Edition

References:

1. Research Methodology: An Introduction for Science & Engineering Students', by Stuart Melville and Wayne Goddard, Juta and Company Ltd, 2004
2. Research Methodology: An Introduction' by Wayne Goddard and Stuart Melville, Juta and Company Ltd, 2004
3. Research Methodology, G.C. Ramamurthy, Dream Tech Press, New Delhi
4. Management Research Methodology' by K. N. Krishnaswamy et al, Pearson Education



| COURSE NO.: | COURSE TITLE | CREDITS | |
|--|----------------------|---------------|--|
| 04 GN 6001 | RESEARCH METHODOLOGY | 0-2-0: 2 | |
| MODULES | | Contact Hours | |
| MODULE : 1 Introduction to Research Methodology: Concepts of Research, Meaning and 2 Objectives of Research, Research Process, Types of Research, Type of research: Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, and Conceptual vs. Empirical | | 5 | |
| MODULE :2 Criteria of Good Research, Research Problem, Selection of a problem, Techniques involved in definition of a problem, Research Proposals – Types, contents, Ethical aspects, IPR issues like patenting, copyrights. | | 4 | |
| INTERNAL TEST 1 (MODULE 1 & 2) | | | |
| MODULE: 3 Research Design : Meaning, Need and Types of research design, Literature Survey and Review, Identifying gap areas from literature review, Research Design Process, Sampling fundamentals, Measurement and scaling techniques, Data Collection – concept, types and methods, Design of Experiments. | | 5 | |
| MODULE 4: Quantitative Techniques: Probability distributions, Fundamentals of Statistical analysis, Data Analysis with Statistical Packages, Multivariate methods, Concepts of correlation and regression - Fundamentals of time series analysis and spectral analysis. | | 5 | |
| INTERNAL TEST 2 (MODULE 3 & 4) | | | |
| MODULE: 5 Report Writing: Principles of Thesis Writing, Guidelines for writing reports & papers, Methods of giving references and appendices, Reproduction of published material, Plagiarism, Citation and acknowledgement. | | 5 | |
| MODULE: 6 Documentation and presentation tools – LaTeX, Office with basic presentations skills, Use of Internet and advanced search techniques. | | 4 | |
| | | | |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------|----------|------|
| 04 ME 6191 | Seminar-I | 0-0-2: 2 | 2015 |

Pre-requisites: Nil

Each student shall present a seminar on any topic of interest related to the core / elective courses offered in the M.Tech Programme. He / she shall select the topic based on the references from international journals of repute. They should get the paper approved by the Programme Co-ordinator / Faculty member in charge of the seminar and shall present it in the class. Every student shall participate in the seminar.

The students should undertake a detailed study on the topic and submit a report at the end of the semester. Marks will be awarded based on the topic, presentation, participation in the seminar and the report submitted.



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|----------------------------|---------|------|
| 04 ME 6193 | Industrial Engineering Lab | 0-0-2:1 | 2015 |

Pre-requisites: Nil

Course Objectives:

The lab shall provide an environment to undertake method, motion and time study, ergonomic evaluation, quality control and reliability analysis exercises within the infrastructure of workshop of Department of Mechanical Engineering and Industries around at the basic level.

Typical laboratory course shall contain a minimum of 10 experiments preferably from multiple domains highlighted below.

- Experiments on Method Study: Practical application of Operation process charts, Flow process charts, Multiple Activity chart, Two-handed Process chart, Travel Chart, Flow and string diagrams, Models and templates.
- Experiment on Motion Study: Motion study using paper-pen, Micro motion study using video analysis- preparation SIMO chart
- Experiments on Work Measurement Analysis: Standard time estimation using conventional stop watch, Use of Work Sampling analysis, Use of PMTS like Work Factor system / MTM / MOST
- Experiments on Learning Curves
- Experiments on Ergonomic Evaluation: Analysis of manual material handling task, Postural analysis of a manual task, Estimation of physical exertion level in a manual task, Estimation of cognitive demand in a manual task
- Experiment to evaluate Work-system: Anthropometrics and workstation evaluation, Evaluating illumination level, Hand tool and equipment design, Use of virtual reality or human modeling to evaluate workspace
- Experiments on Quality Control: Construction of X chart, R chart, P chart and C chart, Construction of OC curve
- Experiments using Design of Experiment principles: DOE using two-level factorial design, DOE using fractional factorial design
- Experiments on Automation and Product testing: CNC programming and machining of a part, Quality assessment and reliability testing of product or system.



SEMESTER II

Syllabus

| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------------------|----------|------|
| 04 ME 6102 | Quantitative Techniques | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

This subject will provide students with

1. Ability to understand and analyse managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively
2. Knowledge of formulating mathematical models for quantitative analysis of managerial problems in industry;
3. Skills in the use of Operations Research approaches and computer tools in solving real problems in industry

Syllabus

Introduction to Operations Research; Deterministic versus probabilistic models; Linear Programming; Transportation models; MODI method; Vogel's approximation method; Assignment Models; Dynamic Programming; Non Linear Programming; Queuing model

Course Outcome:

Upon completion of the subject, students will be able to

1. recognize the importance and value of Operations Research and mathematical modelling in solving practical problems in industry;
2. formulate a managerial decision problem into a mathematical model;
3. understand Operations Research models and apply them to real-life problems;
4. use computer tools to solve a mathematical model for a practical problem.

Text Books:

1. Gupta, P. K., and Hira, D.S. (2007). Operation Research 6th Edition. S Chand
2. Ravindran, A., James Solberg, J., Don Philips, T. (2012). Operation Research – Principle & Practice. John Wiley & Sons Inc (sea) Pvt Ltd.

References:

1. Katta G. Murty, "Operations Research, Deterministic Optimization Models", Prentice Hall, 1995
2. Dimitri Bertsekas, P., (2005). Dynamic Programming. John Wiley & Sons Inc (sea) Pvt Ltd.
3. Katta G. Murty, "Case Studies in Operations Research: Applications of Optimum Decision Making".

COURSE PLAN



| COURSE NO. | COURSE TITLE | CREDITS | |
|---|-------------------------|----------------------|-------------------------|
| 04 ME 6102 | QUANTITATIVE TECHNIQUES | 3-0-0:3 | |
| MODULES | | Contact hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to Operations Research: Models and mathematical models, optimization, systems approach, objective function, decision variable, constraints, decision rule, parameters. Deterministic versus probabilistic models, static versus dynamic models, step in implementation of operation research. | | 7 | 15 |
| MODULE 2: Linear Programming: Formulation of Linear Programming models, graphical method of solving linear programming problems, simplex method of solving LP problems- maximization problems, minimization problems and problems involving artificial variables, concept of duality, concept of degeneracy, sensitivity analysis | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Transportation models: Stepping stone method using the Northwest Corner rule, MODI method Minimum cost method of getting the first feasible solution, Vogel's approximation method, degeneracy in transportation problem, Assignment Models: Floods Technique or the Hungarian Method. | | 7 | 15 |
| MODULE 4: Dynamic programming: Concept of state, stage, policy, return, value of state and principle of optimality. Solution of deterministic finite state models, Markov Chains: Concept of state, transition matrix and probability vectors, Determination of steady state probabilities, absorbing Markov Chains. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Nonlinear Programming, Integer (and Combinatorial) Programming, and Multi-objective methods, mathematical modelling, constructing appropriate mathematical model for optimum decision making problems arising in applications. | | 7 | 20 |
| MODULE 6: Queuing models: Single line single server infinite population model with Poisson arrival and Exponential service times, single line single server finite population model with Poisson arrival and Exponential service times; Simulation: Monte-Carlo simulation. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------------|----------|------|
| 04 ME 6104 | Quality Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. The course aims to engage the student on contemporary issues pertaining to the management of quality in services and manufacturing.
2. The conceptual and analytical skills developed in this course should enable the student to provide leadership in managing for quality.

Syllabus

Quality Concepts; Quality tools; Quality costs, Quality control, Quality Assurance, Quality planning; Statistical Process Control; Control charts for attributes; Acceptance Sampling; Total Quality Management; Six Sigma

Course Outcome:

The student will understand the concept of quality management and will be able to use tools required for quality management in an industry.

Text Books:

1. Montgomery, D.C. (2011). Introduction to Statistical Quality Control, 2nd Edition, John Wiley & Sons.
2. Grant, E.L. and Leavenworth, R.S. (2000). Statistical Quality Control, TMH.

References:

1. Besterfield, D.H. (2002). Total Quality Management, Pearson Education Asia.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|--------------------|----------------------|-------------------------|
| 04 ME 6104 | QUALITY MANAGEMENT | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Quality Concepts, Quality Dimensions ,Quality definitions; Quality control, Quality Assurance ,Quality planning Quality costs ,Economics of quality loss function | | 7 | 15 |
| MODULE 2: Statistical Process Control: Process variability, process capability, machine capability and gauge. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Control charts for attributes, Demerit control chart, control charts for individual measurement, moving range chart, multi-variate chart, cum-sum chart, capability studies – Statistical tolerance | | 7 | 15 |
| MODULE 4: Acceptance Sampling: Economics of sampling – Acceptance sampling by variables and attributes – Single, double and sequential plans, OC curves,ATI, ASN, AOQL Standard sampling tables-IS2500, Dodge- Roaming and MIL- standards | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Total Quality Management And Six Sigma: TQM concepts, Quality system, seven tools of quality, 5S, QFD, KAIZEN, POKAYOKE | | 7 | 20 |
| MODULE 6: Six sigma concepts – DMAIC/ DMADV approach. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------------------------------|----------|------|
| 04 ME 6106 | Financial Management And Accounting | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives

1. To provide a theoretical framework for considering corporate finance problems and issues and to apply these concepts in practice.
2. To understand the fundamental concepts, theories in accounting.

Syllabus

Finance Management, Financial Statements, Ratio analysis, Capital Budgeting, Appraisal of Project Profitability, Accounting and its functions, Trial Balances, Final Accounts of Trading Organizations, Analysis of Financial Statements

Course Outcome

The student will understand the basics of finance management and accounting and will be able to prepare do accounting and preparation of simple financial statements

Text Books:

1. Guerrieri, D., Haber, F., Hoyt, W., and Turner, R. (2010). Accounting: Basic Principles and Applications. Tata McGraw-Hill.
2. Pillai, R.S.N., Uma, S.B. (2010). Fundamental of Advanced Accounting, Vol-I.S.Chand Group, New Delhi.

References:

1. Jain, K., and Somani, R. Accounting for Managers. Wiley India Ltd.
2. Choi, F.D., and Meek, G. K. (2010). International Accounting, 7th edition. Pearson Education.
3. Khan, M.Y., and Jain, P.K. (2012). Basic Financial Management. Tata McGraw-Hill.





COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|-------------------------------------|---------------|------------------|
| 04 ME 6106 | FINANCIAL MANAGEMENT AND ACCOUNTING | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Finance Management - Nature, Scope and Functions. Financial Statements - Nature and limitations, Tools and Techniques of Analysis | | 7 | 15 |
| MODULE 2: Ratio analysis - Computation and Interpretation of Important ratio, Profitability ratio, Activity ratio, Leverage ratio, Use and limitations of ratio analysis. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Capital Budgeting, Appraisal of Project Profitability - Risk, Profitability and Investment Decisions. | | 7 | 15 |
| MODULE 4: Accounting and its functions, Accounting Principles - Accounting Equation - Journalizing - Posting - Balancing of Accounts. Financial books - Books of Original Entry - Ledgers - Cash Books. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Trial Balances (Simple Problems only), Trial Balances errors and their rectification, Adjusting/Closing and Transfer entries, Adjusting/Closing and Transfer entries. | | 7 | 20 |
| MODULE 6: Final Accounts of Trading Organizations - Trading and profit and Loss Account - Balance Sheet (Sole-trader ship only). Receipts and Payment Account - Income and Expenditure Account - Balance Sheet (Simple Problems only). Analysis of Financial Statements. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|---------------------------|----------|------|
| 04 ME 6108 | Soft Computing Techniques | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives

1. To understand basic neural networks, fuzzy systems, and optimization algorithms concepts and their relations.

Syllabus

Genetic Algorithms, Coding, Data structures, Simulated Annealing, Tabu Search, Fuzzy Logic, Artificial Neural Networks, Fuzzy set operations, ANNs Learning Approaches

Course Outcome

The student will be able to apply Genetic Algorithms and Artificial Neural Networks as computational tools to solve a variety of problems in various area of interest.

Text Books:

1. Deb, K. (1998). Optimization for Engineering Design. Prentice Hall of India (P) Ltd., New Delhi.
2. Goldberg, D.E. (1989). Genetic Algorithms in Search, Optimization, and Machine Learning. Addison-Wesley.

References:

1. Schalkoff, R.J. (1997). Artificial Neural Networks. McGraw-Hill Companies Inc.
2. Sundareswaran, K. (2005). A Learner's Guide to Fuzzy Logic Systems. Jaico Publishing House.





COURSE PLAN

| COURSE NO. | COURSE TITLE: | CREDITS | |
|--|----------------------------------|----------------------|-------------------------|
| 04 ME 6108 | SOFT COMPUTING TECHNIQUES | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Genetic Algorithms: Introduction to Genetic Algorithms (GA) - Goals of optimization - Differences and similarities between genetic algorithm and traditional methods | | 7 | 15 |
| MODULE 2: Schemata - Terminology of GA - Strings, Structure, Parameter set - Coding -Fitness function, Data structures - GA operators – Algorithm, Applications. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Simulated Annealing: Introduction - Algorithm - Applications. Tabu Search: Introduction - Algorithm - Applications. | | 7 | 15 |
| MODULE 4: 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 fuzzy logic system - Design aspects of fuzzy systems, Applications of fuzzy logic - Simple examples. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: 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 | | 7 | 20 |
| MODULE 6: Relationship of ANNs to other technologies - ANNs Learning Approaches - Training set and Test set - Generalization - Learning curves - Applications of ANN in optimization - Simple examples. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-----------------------------------|----------|------|
| 04 ME 6112 | Plant Engineering and Maintenance | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives

1. To understand the fundamental concepts, theories and methods in Plant engineering and maintenance
2. To introduce the purpose of learning plant engineering and management for meeting the requirement of various professional field applications.

Syllabus

Wear and Lubrication, Lubricants, Maintenance, Replacement, MAPI method, SWOT analysis, Reliability, Maintainability and availability, Non-destructive testing and diagnostic instruments, Safety management

Course Outcome

The student will be able to understand maintenance management systems in an industry and can apply the concepts for creating and maintaining a proper system

Text Books:

1. Rosder, R. C. (2002). Standard Handbook of Plant Engineering 3rd edition. McGraw-Hill.
2. Shillon, B. S. (2006). Specifications of Maintainability, Maintenance, and Reliability for Engineers. CRC Press.

References:

1. Srivasthava, S. K. (2002). Industrial Maintenance Management. Prentice-Hall of India.
2. Bhooshan, B., and Guptha, B. K. (1997) Handbook of Tribology. Krieger Pub Co.
3. Sharma, S. C. (2002). Inspection, Quality control and Reliability. Khanna Publishers.
4. Gopalakrishnan, P., and Banergy, A. K. (2004). Maintenance and Spare parts management. PHI Learning.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|-----------------------------------|---------------|------------------|
| 04 ME 6112 | PLANT ENGINEERING AND MAINTENANCE | 3-0-0:3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Wear and Lubrication:-wear-classification-theories of wear-analytical treatment of wear- stages of wear-effect of moisture, gas and liquid on wear-effects of temperature-corrosive wear- fretting-fatigue-calculation of working life-design considerations. | | 7 | 15 |
| MODULE 2: Lubricants:- solid, fluid and semi fluid-synthetic lubricant-general properties and uses-tests and classification. Aniline point-cloud, pour and flash point-carbon residue-flash and fire points- sulphur content-lubricant additives-lubricant systems-lubrication equipments and components. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Maintenance:- Breakdown and preventive maintenance-deterioration and failure analysis- planning, scheduling, and controlling of maintenance work-organisation for maintenance. | | 7 | 15 |
| MODULE 4: Replacement:- causes of deterioration and obsolescence-sudden and gradual obsolescence and deterioration-economic analysis-MAPI method. Evolution of maintenance management- SWOT analysis-subjective methods of evaluation-objective criteria of evaluation. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Reliability:-concept and definition-chance of failure-wear and failure application of stochastic model for reliability studies, Reliability of series, reliability of series, Parallel and stand by systems, Maintainability and availability-problems. | | 7 | 20 |
| MODULE 6: Non-destructive testing and diagnostic instruments:- inventory control of spare parts-simple problems. Safety management: - accident prevention program-designing of safe operation-fire protection –legal provisions for safety in industry. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|------------------------------|----------|------|
| 04 ME 6114 | Practical Project Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand and articulate the importance of Project Management in any business project
2. To use tools and techniques to manage a project during execution.

Syllabus

Systems approach, Planning of Projects. Work definition, Scheduling of Projects, Project scheduling with resource constraints, Budgeting and Appraisal of projects, Project appraisal, Controlling of Projects, Softwares in project management

Course Outcome:

The student will be able to learn how to identify project components, organize them effectively and control the project from the earliest steps of developing the project charter through the final steps of a project.

Text Books:

1. Chandra, P. (2004). Projects planning Analysis Selection Implementation and Review, 7th edition. Tata McGraw-Hill.
2. Maylor, H. (2004). Project Management, 3rd edition. Pearson Education India.Engineers. CRC Press.

References:

1. Ghattas, R.G., Mckee, S.L., and Ghattas, R. (2000). Practical Project Management, 1st edition. Prentice hall.
2. Meredith, J.R., and Mantel, S.J. (2010). Project Management – A Managerial Approach, 7th edition. Wiley India.
3. Kerzner, H. (2012). Project Management – A Systems Approach to Planning, Scheduling and Controlling, 12th edition. Wiley India.





COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|-------------------------------------|-----------------|------------------|
| 04 ME 6114 | PRACTICAL PROJECT MANAGEMENT | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction and Systems approach - Basic characteristics of modern projects, The need of project management, Types of project managers, The forms of project management. The systems approach, Basic systems concept, A general systems approach, The life cycle concepts of projects, A systems design algorithm. | | 7 | 15 |
| MODULE 2: Planning of Projects - Project organization structure, Formal and informal organization structure, Forms of organization structures, Requirements of project organization, Matrix organization structure, Pure project organization structure, selection of project organization structure. Work definition - Planning of project work, Work Breakdown Structure (WBS), Responsibility chart and responsibility matrix, Integration of WBS and organization structure, a detailed project plan. Conflict and negotiation. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Scheduling of Projects - Project scheduling, Definitions, Gantt charts, Network scheduling, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM). Risk analysis using simulation. Project scheduling with resource constraints - crashing of projects, Resource levelling, resource loading and simple problems. | | 7 | 15 |
| MODULE 4: Budgeting and Appraisal of projects - Project costing, Cost of project, Mean of finance, cost of production, cost estimation and budgeting, and Project Cost Accounting System (PCAS). Construction and use of audit report, Project audit life cycle, Essentials of audit and evaluation, Varieties of project termination, the termination process, The Final Report. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Project appraisal - Financial evaluation of projects, Net Present Value Method, Benefit Cost Ratio method, Internal Rate of Return method, Accounting Rate of return method, Assessment of various methods, simple problems. | | 7 | 20 |
| MODULE 6: Controlling of Projects - Introduction, Phases and types of project control, Variance Analysis of project performance, Problems of project control. Simple problems. The role of project manager, team work and leadership functions, Information needs and the reporting process, computers in project management, software's in project management. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-----------------------|----------|------|
| 04 ME 6116 | Industrial Scheduling | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To learn the importance of industrial scheduling.
2. To develop idea about different scheduling.
3. To learn the applications of scheduling.

Syllabus

Importance of scheduling, Aggregate production planning, Flow shop scheduling. Scheduling in process industries, Job shop scheduling, Disjunctive programming, Simulation studies, Scheduling of Flexible assembly systems, Scheduling balancing, Applications in manufacturing systems

Course Outcome:

The student will be able to describe the systems and processes involved in scheduling and will be able to solve scheduling problems

Text Books:

1. Pinedo, M. and Chao, X. (1993). Operations Scheduling: With application in Manufacturing and Services. McGraw Hill.
2. Kenneth, R.B. (1974), Introduction to sequencing and scheduling. John Wiley and Sons.

References:

1. Conway, R.W., Maxwell, W.L., and Miller, L.M. (1967). Theory of Scheduling. Addison, Wesley.
2. Pinedo, M. (1995). Scheduling: theory, algorithms and systems. Prentice Hall,
3. New Delhi.
4. French, S. (1982). Sequencing and Scheduling. Elis Horwood Ltd., Chichester, U.K.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|-----------------------|---------------|------------------|
| 04 ME 6116 | INDUSTRIAL SCHEDULING | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction: Importance of scheduling in implementation of production planning – overview of models – machine configurations – processing characteristics and constraints – objectives and performance measures – computational complexity;. NP complete and NP hard – optimality of schedules. | | 7 | 15 |
| MODULE 2: Aggregate production planning – Master production scheduling – Project scheduling, Single machine sequencing with independent jobs; without due dates, with due dates – adjacent pair wise interchange methods – branch and bound approach – neighbourhood search techniques – random sampling – parallel machine models. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Flow shop scheduling: Introduction – permutation schedules – Johnson’s problem-Ignall and Schrage algorithm. Dominance properties for makespan problems –CDS, Palmer, Gupta heuristics. Scheduling in process industries with no waiting or work in process. | | 7 | 15 |
| MODULE 4: Job shop scheduling Introduction, types of schedules, schedule generator. Disjunctive programming and Branch and bound – shifting bottleneck heuristic and the makes pan. Simulation studies -elements of dynamic job shop , Scheduling in dynamic flow systems. Use of priority disciplines | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Applications and directions: Scheduling of Flexible assembly systems – lot sizing and scheduling | | 7 | 20 |
| MODULE 6: Scheduling balancing and other aspects of design in mixed model assembly lines and flow lines A survey of other scheduling problems. Applications in manufacturing systems. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--|----------|------|
| 04 ME 6118 | Reliability Engineering and Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the basic concepts of reliability and to compute reliability based on different methods
2. To understand failure data analysis and Total Productive Maintenance
3. To understand the concept of maintainability and availability

Syllabus

Basic Concepts of Reliability, Reliability and Quality, Reliability Mathematics, Concept of Bathtub Hazard Rate curve, Reliability Determination Methods, Advanced Reliability Evaluation Concepts, Reliability Optimization, Failure Data Analysis, Total Productivity Maintenance (TPM), Maintainability and Availability Concepts, Reliability Management.

Course Outcome:

The student will understand concepts of reliability, Total Productive Maintenance, maintainability, availability etc and will be able to solve problems involving reliability

Text Books:

1. Balagrusamy, E. (1984). Reliability Engineering. Tata-McGraw Hill Publishing Company Limited, New Delhi.
2. Dhillon, B.S. (1983). Reliability Engineering in System Design and Operation. Von Nostrand Reinhold Company, New York, 1983.

References:

1. Nakajima Seiichi, N. (1997). Introduction to TPM. Productivity Press India (P) Madras.
2. Lewis, E. E. (1987). Introduction to Reliability Engineering. John Wiley & Sons, New York.
3. O'Connor Patric, D.T. (1995). Practical Reliability Engineering, 3rd revised edition. John Wiley & Sons.
4. Stamatis, D.H. (1997). Failure Mode and Effect Analysis. Productivity Press India (P) Madras



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|---|-----------------|------------------|
| 04 ME 6118 | RELIABILITY ENGINEERING AND MANAGEMENT | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: 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. | | 7 | 15 |
| MODULE 2: 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. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: 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 cause failures, Fault trees, Failure mode and effect analysis. Reliability Optimization: Redundancy optimization-parallel, series-parallel, and series networks | | 7 | 15 |
| MODULE 4: Failure Data Analysis: Failure data banks, Non repairable items failure data analysis-complete data, incomplete data- incomplete failure data hazard plotting technique, Maximum likelihood estimation technique. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Total Productivity Maintenance (TPM): Distinctive features of TPM, Basic philosophy of zero defects (ZD), Maximizing equipment effectiveness, Six major losses, TPM development activities, Steps of TPM development, Autonomous maintenance, Planned maintenance, Measuring TPM effectiveness | | 7 | 20 |
| MODULE 6: 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 | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|---|----------|------|
| 04 ME 6122 | Business Communication and Report Writing | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand and appreciate the importance of communication in business
2. To develop business writing ability by acquiring skills in objective or non-personal writing
3. To understand human resource skills required for good performance in business

Syllabus

Introduction to Communication, Effective communication in Business, Verbal Communication, Types of effective Technical and Business Presentation, Written communication in business, Memos, Organising skills, Risk taking skills, Time management skills, HR skills

Course Outcome:

1. The student will be able to describe different forms of communication in business
2. The student will be demonstrate his/her ability to communicate effectively in business contexts
3. The student will have increased human resource skills required for performing well in business

Text Books:

1. Shurts Robert L, Written Communication in Business.
2. Murphy, Herta A., and Peck, Charles E. (1980). Effective Business & Communication, 3rd edition .Tata McGraw Hill, New Delhi

References:

1. Schutte, William M. and Steinberg, Erwin R. (1991). Communication in Business & Industry.
2. Sigband, Norman P. (1960). Effective Report Writing. Harper and Row.
3. Mackay, John J. and Fitzner, C. (1984) Business Communication skills: Principles & practice. Prentice Hall.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|---|---------------|------------------|
| 04 ME 6122 | BUSINESS COMMUNICATION AND REPORT WRITING | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to Communication – understanding communication. Internal and external communication, Effective communication in Business. | | 7 | 15 |
| MODULE 2: Verbal Communication including Planning, Preparation, Delivery, Feedback and assessment of activities like: Public speaking, Group Discussion, | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Oral Presentation skills, Perfect Interview, Listening and observation skills, body language and use of Presentation aids. | | 7 | 15 |
| MODULE 4: Written communication in business – Business letters ,principles and mechanism of letter writing, types of letters and their importance | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Memos – Routine messaging, requests, replies, announcements, brochures, newsletters, articles.Reports, Writing Business reports, Technical report writing, project proposals | | 7 | 20 |
| MODULE 6: Time management skills, HR skills: leadership, communication, negotiation, motivating (inter personal and inter group). Risk taking skills, Organising skills: Events management. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------------------|----------|------|
| 04 ME 6124 | Total Quality Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the philosophy and core values of Total Quality Management (TQM)
2. To apply and evaluate best practices for the attainment of total quality.

Syllabus

Concepts And Philosophy, principles of TQM, Quality philosophies of Deming, Crosby, Juran, Ishikawa and Feigenbaum, TQM Process, Statistical process control. TQM Systems: Quality policy deployment, Implementation of TQM, Steps in TQM implementation; Introduction to EMS; Case studies

Course Outcome:

The student will be able to select and apply appropriate techniques in identifying customer needs, as well as the quality impact that will be used as inputs in TQM methodologies.

Text Books:

1. Besterfield, D. H. (2002). Total Quality Management. Pearson Education Asia.
2. Rose, J.E. (1993). Total Quality Management. Kogan Page Ltd.

References:

1. Bank, J. (1993). The essence of total quality management. PHI.
2. Bounds, G., and Yorks, L. (1994). Beyond Total Quality Management. McGraw Hill.
3. Osada, T. (1991). The 5S's The Asian Productivity Organisation.
4. Imami, M. (1986). KAIZEN. McGraw Hill.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|--------------------------|---------------|------------------|
| 04 ME 6124 | TOTAL QUALITY MANAGEMENT | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Concepts And Philosophy: Basic concepts, leadership, customer satisfaction, employee involvement, Continuous process improvement, supplier partnership, | | 7 | 15 |
| MODULE 2: Need for TQM, principles of TQM, TQM framework. Quality philosophies of Deming, Crosby, Juran, Ishikawa and Feigenbaum, TQM models. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: TQM Process: QC tools, problem solving methodologies, new management tools. Statistical process control. Quality circles, bench marking, strategic quality planning. | | 7 | 15 |
| MODULE 4: TQM Systems: Quality policy deployment, quality function deployment, introduction to BPR and FMEA. Quality System: Need for ISO 9000 system, advantages, clauses of ISO 9000, Implementation of ISO 9000, QS9000 systems | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Implementation Of TQM: KAIZEN, 5S, JIT, POKAYOKE, Taguchi methods. Steps in TQM implementation, National and international quality awards, case studies. | | 7 | 20 |
| MODULE 6: Introduction to EMS, quality costs, quality auditing. Case studies. Performance measures, one factor, two factor and orthogonal designs, parameter design, tolerance design- loss function | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------------------------|----------|------|
| 04 ME 6126 | Management Information System | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the evolution and role of MIS in an organisation
2. To understand the design of MIS and basic steps in design
3. To understand the process of decision making using MIS

Syllabus

System approach, MIS organization within the company, Conceptual information system design, conceptual design report, Detailed information system design, Evolution of information systems, Information system softwares, Information systems and decision making, MIS for making programmed decisions, Information technology and MIS.

Course Outcome:

The student will be able to

1. Describe the evolution and role of MIS in an organisation
2. Describe the designing and functioning of MIS
3. Describe computer based applications in MIS

Text Books:

1. Henry, C., and Lucas Jr. (1992). The analysis, design and implementation of information systems. 4th Edition, McGraw Hill Company, New York.
2. Burch, J. E., Strater, F. R and Grudnikski, G. (1987). Information systems: theory and practice. John Wiley and Sons, New York

References:

1. Murdick, R. G., Ross, J. E., and Claggett, J. R. (1992). Information systems for modern management. 3rd Edition, Prentice Hall of India Private Ltd., India.
2. O'Brien, J. A. (1997). Management information systems: a managerial end user perspective. Galgotia Publications



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|-------------------------------|----------------------|-------------------------|
| 04 ME 6126 | MANAGEMENT INFORMATION SYSTEM | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction: Meaning and definition – system approach – role of MIS to face increased complexity of business and management – system view of business – MIS organization within the company. | | 7 | 15 |
| MODULE 2: Conceptual information system design: Defining the problems – setting system objectives – establishing system constraints – determining information needs – determining information sources Developing alternate conceptual design and selecting one – documenting the conceptual design – preparing the conceptual design report. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Detailed information system design: Informing and involving the organization – project management of MIS detailed design – identifying dominant and trade-off criteria defining the subsystems – sketching the detailed operating subsystems and information flows – determine the degree of automation. Informing and involving the organization again – inputs, outputs and processing – early system testing – propose an organization to operate the system – documentation – revisiting the manager-user | | 7 | 15 |
| MODULE 4: Evolution of information systems: Basic information systems – financial information systems – production / operations systems, marketing information systems – personnel information systems. Information system softwares – selection – complexity and errors. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Information systems and decision making: Decision making and MIS – programmed and non-programmed decision. MIS for making programmed decisions – decision-assisting information systems – components of decision support systems | | 7 | 20 |
| MODULE 6: Information technology and MIS: Comparison of manual and computer based information systems – conversation of manual to computer based systems. Types of computer based applications in MIS – application of multimedia, internet, intranet and extranet technologies in MIS. E-business: Introduction – models – security. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------|----------|------|
| 04 ME 6192 | Mini Project | 0-0-4: 2 | 2015 |

Pre-requisites: Nil

Course Objectives:

At the end of the project the student has to submit a report on the work being carried out. The mini project is designed to develop practical ability and knowledge about practical tools/techniques in order to solve the actual problems related to the industry, academic institutions or similar area.

Students can take up any application level/system level project pertaining to a relevant domain. Projects can be chosen either from the list provided by the faculty or in the field of interest of the student. For external projects, students should obtain prior permission after submitting the details to the guide and synopsis of the work.

The project guide should have a minimum qualification of ME/M.Tech in relevant field of work. At the end of each phase, presentation and demonstration of the project should be conducted, which will be evaluated by a panel of examiners. A detailed project report duly approved by the guide in the prescribed format should be submitted by the student for final evaluation. Publishing the work in Conference Proceedings/ Journals with National/ International status with the consent of the guide will carry an additional weightage in the review process.



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------|----------|------|
| 04 ME 6194 | Software Lab | 0-0-2: 1 | 2015 |

Pre-requisites: Nil

The lab shall provide facilities to build capabilities in diverse software applications for appropriate data collection and analysis relating to Industrial Engineering domain. The lab could include experiments with computer applications in some of the basic domain areas highlighted below, but must be limited to demonstrating/solving Industrial Engineering problems or are in the purview of the Industrial Engineering domain. A typical laboratory course shall contain a minimum of 10 experiments preferably from multiple domains highlighted below.

Note: It is not mandatory to provide the software listed below for the course, and is presented only as a guide.

- Design and testing of products, process or work-systems:
 - Process planning and verification of design.
 - Ergonomic design of product, work-station / work-space.
 - Ergonomic analysis of product or work-system.
 - Layout analysis and design.
 - Setting standard times for tasks or process.
 - Analysis of quality of process or output.
 - ⇒ Representative software includes JACK, CATIA, CRAFT, CORELAP, ALDEP, FLOWPLANNER, WORKSTUDY+, WORKPRO, SPSS, MINITAB.

- Optimization of resources or solving decision making problems with constraints:
 - Solving linear programming problems.
 - Solving dynamic programming problem, goal programming problem, problems in markov process, queuing problem.
 - ⇒ Representative software includes LINDO / LINGO, TORA, PALISADE, WINQSB, MATLAB.

- Simulation and system analysis
 - Simulation of queuing systems, material handling system, production systems, inventory systems, maintenance and replacement systems
 - Simulation for investment analysis and network.
 - ⇒ Representative software includes SPSS, WITNESS, ARENA, SIMSCRIPT, MATLAB.

- Scheduling, Project management and Supply chain modeling and analysis
 - Modeling simple job-shop scheduling problems.
 - Undertake CPM and PERT exercise.
 - ⇒ Representative language & software includes C++, MS PROJECT, PRIMAVERA.

- Information system design and analysis
 - Design of user interface and testing.



- Analysis and design of DBMS for MIS.
- Testing DSS tools for managers within MIS framework.
- ⇒ Representative language & software includes JAVA, VISUAL-BASIC, FRONT-PAGE, ADOBE CREATIVE SUITE, MS-ASSESS, ORCALE, SAP.

- Data collection tools and statistical analysis for decision making
 - Solving univariate / multivariate linear regression problem.
 - Factor analysis, clustering or classification analysis for data reduction.
 - Quality analysis based on control charts.
 - ⇒ Representative software or language includes SPSS, MINITAB, SAS.

SUMMER BREAK

| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|-------------------|----------------------------|-----------------|-------------|
| 04 ME | Industrial Training | 0-0-4: 0 | 2015 |

Pre-requisites: Nil

The student shall undergo Industrial training in an industry/company approved by the institution and under the guidance of a staff member in the concerned field. At the end of the training the student has to submit a report on the work being carried out. The objective of the training is to develop practical ability and knowledge about practical tools/techniques used to solve the actual problems in industry.

At the end of training presentation and review should be conducted which will be evaluated by a panel of examiners. A detailed report duly approved by the guide in the prescribed format should be submitted by the student evaluation.

It is a zero credit pass/fail course, and its evaluation is to be done in the third semester. The duration for the industrial training shall be 3 weeks.



SEMESTER – III

Syllabus

| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|---------------------------------|----------|------|
| 04 ME 7101 | System Modelling and Simulation | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the basic system concept and definitions of system
2. To learn techniques to model and to simulate various systems
3. To be able to analyze a system and to make use of the information to improve the performance

Syllabus

System Concept, System Simulation, Random Number Generation, Input Modelling for Simulation, Verification and Validation of Simulation Models, Output Analysis for a Single Model, Simulation Modelling and Analysis of Manufacturing Systems, Simulation of job shop manufacturing systems.

Course Outcome:

The student will demonstrate the ability to model and simulate various engineering systems

Text Books:

1. Deo, N. (1997). System Simulation with Digital Computer. Prentice Hall of India.
2. Askin, R.G. and Standridge, C.R. (1993). Modelling and Analysis of Manufacturing Systems. John Wiley & Sons

References:

1. Law, A.M. (2008). Simulation Modeling and Analysis, 4th edition. Tata McGraw-Hill.
2. Banks, J., Carson, J.S., Nelson, B.L., and Nicol, D.M. (2004). Discrete-Event System Simulation, 5th edition. Pearson Education.
3. Gordon, G. (2011). System Simulation, 2nd edition. Prentice Hall India.
4. Sengupta, S. (2013). System Simulation and Modeling. Pearson Education India.
5. Panneerselvam, R., and Senthilkumar, P. (2013). System Simulation, Modelling and Languages. Prentice Hall India.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS: | |
|--|--|-----------------|------------------|
| 04 ME 7101 | SYSTEM MODELLING AND SIMULATION | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: 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. | | 7 | 15 |
| MODULE 2: 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. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: 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. | | 7 | 15 |
| MODULE 4: Input Modelling for Simulation: Data collection, Identifying the distribution with data, Parameter estimation, Goodness of fit test, Chi square, Kolmogorov and Smirnov tests, Selecting input model when data are not available. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: 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. Metamodeling: Simple linear regression, Testing for significance of regression, Multiple linear regression | | 7 | 20 |
| MODULE 6: 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. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|------------------------------------|----------|------|
| 04 ME 7103 | Modern Manufacturing System Design | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. Understand the tools and methods for analysis, design, and operation of manufacturing systems and current trends in manufacturing
2. To understand the process of aggregate planning, scheduling production flow analysis etc.
3. To familiarize with softwares used in production systems
4. To understand systems modelling and simulation in manufacturing

Syllabus

Fundamental Introduction to Manufacturing System, Aggregate planning methods, Scheduling, Dispatching, Facilities Planning, Facility Layout, Flexible Manufacturing Systems, Characteristics of Lean systems for services and Manufacturing, Reengineering, Resources Planning, Enterprise Resources Planning, Simulation Applications in Manufacturing Systems: Systems modelling, Problem formulation.

Course Outcome:

The student will be able to

1. Describe current trends in manufacturing; formulate and solve problems in scheduling, production flow and simulation of manufacturing problems
2. Work using softwares involved in production systems
3. To model and simulate manufacturing systems

Text Books:

1. Chase, R.B., Aquilano, N.J., and Jacobs, F.R. (2000). Operations Management for Competitive Advantage. Irwin Professional Pub.
2. Ebert, J. R., and Adams, E.E. (2004). Production and Operations Management: Concepts, Models and Behavior. Prentice Hall India

References:

1. Mahadevan, B. (2010). Operations Management: Theory and Practice. Pearson Education India.
2. James, A.T., John, A.W., Yavuz, A.B., and Tanchoc, J.M.A. (2011). Facilities Planning, 3rd edition. Wiley India.
3. Leon, A. (2007). Enterprise Resource Planning, 2nd edition. Tata McGraw-Hill.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|---|-----------------|------------------|
| 04 ME 7103 | MODERN MANUFACTURING SYSTEM DESIGN | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to Operations Management, Current trends in Manufacturing in India, Operations Management functions. Operations management in service systems. Methods of sales forecasting: time series analysis, moving average, exponential smoothing, least square fit methods, regression analysis and other methods such as market survey and Delphi analysis. | | 7 | 15 |
| MODULE 2: Aggregate planning methods - graphical and reaction rate methods. Aggregate planning with linear programming transportation model. Linear Decision Rule. Master Production schedule. Production planning in made-to-stock and made-to-order type of companies. Scheduling - Loading and Sequencing. Gantt charts, Index method, Johnson's method, critical ratio and other methods of loading and sequencing. Dispatching - progress reporting and expediting functions. Designing, installing and evaluating production control system. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Facilities Planning: Plant location - Selection of locations, Factor rating, Transportation methods, Centroid methods. Locating service facilities. Facility Layout - Basic production layout, product layout, Process layout, Group layout (Cellular), Problems in GT/CMS - Design of CMS. Production Flow Analysis, Rank Order Clustering (ROC) Optimization Models, traditional approaches and non-traditional approaches- Simulated Annealing, Genetic Algorithms, Fixed position layout, Retail Service Layout, Office Layout, Automated production Systems, Automation, Software for Automation:- Systematic layout planning, CORELAP, ALDEP and CRAFT. | | 7 | 15 |
| MODULE 4: Flexible Manufacturing Systems - Components of FMS, Structure of FMS, Conceptual model of FMS. Characteristics of Lean systems for services and Manufacturing - Pull method of work flow, Small lot sizes, Kanban system, Value stream mapping, JIT Business Process Reengineering - Principles of Reengineering, Implementation of Reengineering, Issues in Reengineering | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Resources Planning: Planning frame work, Multiple levels in products, Product structure, Bill of Materials, Time phasing the requirement, Determining the Lot size, Lead time information. Material Requirement Planning, Updating MRP Schedules, Safety stock and Safety Lead Time. Capacity Requirement Planning, Distribution Requirement Planning, Manufacturing Resources Planning (MRP-II). Enterprise Resources Planning - Definition, Evolution, Demand of ERP, ERP Modules, Benefits of ERP, Competitive Environment Analysis, Strategic Need Analysis, Feasibility Analysis, ERP soft wares, ERP enabled Business Process Re-Engineering, and Resources Planning in Services | | 7 | 20 |
| MODULE 6: Simulation Applications in Manufacturing Systems: Systems modeling- General systems theory, concept of simulation, simulation as a | | 7 | 20 |



| | | |
|---|--|--|
| <p>decision making tool, types of simulation. Pseudo random numbers, methods of generating random variates, testing of random numbers and variates. Problem formulation - data collection and reduction, time flow mechanism, key variables, logic flow chart, starting condition, run size, experimental design consideration, output analysis and interpretation validation. Comparison and selection of simulation languages, Development of simulation models for queuing systems, production systems, inventory systems, maintenance and replacement systems, investment analysis and network.</p> | | |
|---|--|--|



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|---------------------------|----------|------|
| 04 ME 7105 | Human Resource Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the functions of human resources and its management in the organizational context
2. To understand the stages and processes of HRM
3. To understand the role of human resource manager and identify the ways of managing performance and productivity

Syllabus

Human Resource Management, Human Resources Planning, Recruitment & Selection, Training and Development, Compensation Management, Performance Management System, Quality Circles.

Course Outcome:

After studying the course the student will be able to understand and apply the concepts of human resource management in real time production situation. Also the student is expected to grow more by learning the latest development in the area of HRM and to use the concepts of industrial engineering to effectively link human resources with other functional areas

Text Books:

1. Dessler, G. (2012) Human Resource Management 13th edition. Pearson Education.
2. Mamoria, C. B., and Gankar, S. V. (2002). Personnel Management 23rd edition. Himalaya Publishing House

References:

1. Dwiwedi, R. S. (2000). Managing Human Resources. Galgotia Publishing Company, New Delhi.
2. Pardeshi, P. C. (2012). Human Resource Management.
3. Mirza S. S. (2008). Human Resource Management. Tata McGraw - Hill Education



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|---------------------------|----------------------|-------------------------|
| 04 ME 7105 | HUMAN RESOURCE MANAGEMENT | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Human Resource Management –Introduction and Importance. Conceptual between Personnel Management and HRM , Strategic HRM- role of an HR Manager | | 7 | 15 |
| MODULE 2: Human Resources Planning – Objectives - HRP Process - Manpower Estimation - Job analysis -job Description-Job Specification – Recruitment. Sources of Recruitment - Selection Process-Placement and Induction -Retention of Employees. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Training and Development-Objectives and Needs - Training Process- Methods of Training-Tools and Aids - Evaluation of training Programs. Career Planning-Succession Planning. Different methods of Performance Appraisal - Rating Errors – Competency Management | | 7 | 15 |
| MODULE 4: Compensation Management-Concepts and Components-Job Evaluation- Incentives and Benefits. Retirement/Separation - Superannuation. Voluntary Retirement Schemes- Resignation - Discharge-Dismissal -Suspension-Layoff. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Performance Management System – Definition, Concept and Ethics. Productivity Management-Concepts-TQM-Kaizen. | | 7 | 20 |
| MODULE 6: Quality Circles Industrial relations - Grievance Procedure - Collective Bargaining- Settlement of Disputes. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-----------------------|----------|------|
| 04 ME 7107 | Industrial Ergonomics | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the factors affecting ergonomic design of a workplace
2. To understand the design principles of ergonomics
3. To introduce the purpose of learning important subjects in nanotechnology for meeting the requirement of various professional field applications.

Syllabus

Concepts of human factors engineering and ergonomics; Engineering anthropometry; Ergonomic design; Work physiology, Biomechanics, Manual material handling; Work space and Work place design; Environmental ergonomics, Design consideration and interventions; Cognitive ergonomics

Course Outcome:

The student will be able to understand the principles of ergonomic design and design ergonomically balanced system based on the principles of ergonomics

Text Books:

1. Martin Helander, A guide to the ergonomics of manufacturing, East West press, 2007

References:

1. E.J. McCormic & Mark S. Sangers, Human factors in engineering design, McGraw Hill 2007
2. R.S. Bridger, Introduction to Ergonomics, McGraw Hill, 1995.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|-----------------------|---------------|------------------|
| 04 ME 7107 | INDUSTRIAL ERGONOMICS | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Concepts of human factors engineering and ergonomics Man – machine system and design philosophy Human physical characteristics | | 7 | 15 |
| MODULE 2: Engineering Anthropometry – Static and dynamic anthropometry, Anthropometric aids, Ergonomic design principles, Procedure for anthropometric design. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Work physiology – stress and fatigue, physical work capacity, Biomechanics – posture, movement, Manual material handling | | 7 | 15 |
| MODULE 4: Work Place and Work Station Design, Displays and Controls, Hand tool design. Work process – Duration and rest periods, Design for shift work. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Environmental ergonomics – Effect of Temperature, Humidity, Sound, Lighting Vibration, Measurement and analysis of environmental stress. Design considerations and intervention strategies | | 7 | 20 |
| MODULE 6: Cognitive ergonomics - Information processing and perception, Cognitive aspects and mental workload, Human error and risk perception | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|----------------------|----------|------|
| 04 ME 7109 | Knowledge Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To identify the different types of knowledge and the ways in which knowledge is created and used.
2. Understand the fundamental concepts in the study of knowledge and its creation, acquisition, representation, dissemination, use and re-use, and management.
3. Appreciate the role and use of knowledge in organizations and institutions, and the typical obstacles that KM aims to overcome.
4. Know the core concepts, methods, techniques, and tools for computer support of knowledge management.

Syllabus

Introduction to Knowledge Management, Driving forces in KM, Elements of Knowledge Management, Fuzzy Reasoning and the Quality of Knowledge, Knowledge codification, Knowledge Testing, Knowledge transfer and sharing, Knowledge based value chain, Knowledge management in manufacturing and the service sector.

Course Outcome:

1. The student will be able to describe different types of knowledge and the role of knowledge management in today's organisation
2. The student can explain about creation and management of organisational knowledge through modern tools for knowledge management

Text Books:

1. Elias.M.Awad and Hassan M. Ghaziri – “Knowledge Management”, PHI Learning, 2011
2. SheldaDebowski, “Knowledge Management” Wiley India Pvt. Ltd, 2012

References:

1. Shadbolt, Walter Van de Velde and Bob Wielinga, “Knowledge Engineering and Management”, Universities Press, 2001.
2. Irma Becerra-Fernandez, Avelino Gonzalez& Rajiv Sabherwal(2004) Knowledge Management, Challenges, Solutions and Technologies,Pearson, Prentice Hall
3. Tapan K Panda, “Knowledge Management – A Global Perspective”, Excel books India 2008



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|--|-----------------------------|-----------------|------------------|
| 04 ME 7109 | KNOWLEDGE MANAGEMENT | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to Knowledge Management, Understanding Knowledge, Data, Information and Knowledge, Experience , Cognition, Types of Knowledge, Expert Knowledge , Human Thinking and Learning, Knowledge creation at the level of the individual, Group and organization. Driving forces in KM, Challenges in Building KM Systems, KM System Life Cycle (KMSLS), Knowledge Creation and Knowledge Architecture – Nonaka’s Model of Knowledge, Creation and Transformation | | 7 | 15 |
| MODULE 2: Managing organizational knowledge, Role of KM in today’s organization Multi-dimensional organizational learning, Elements of Knowledge Management, Capturing knowledge, KM Systems. Evaluating the Expert, Developing a Relationship with Experts. Fuzzy Reasoning and the Quality of Knowledge. Knowledge Capturing Techniques, Brain Storming. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Protocol Analysis, Consensus Decision Making, Repertory Grid, Concept Mapping, Black boarding, Knowledge Architecture. Knowledge codification, Need of codification, Modes of Knowledge Conversion, Codification Tools and Procedures, Knowledge maps, Decision Tables, User Acceptance Testing .Decision Trees, case based reasoning. | | 7 | 15 |
| MODULE 4: Knowledge based agents, Knowledge Developer’s Skill Sets, System Testing and Deployment. Knowledge Testing, managing test phase, Approaches to Logical Testing.KM System Deployment, User training, Post implementation | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Knowledge transfer and sharing , Transfer Methods , Role of the Internet, Knowledge Transfer in e-world, Web-centric knowledge management, Data Mining and Business Intelligence , Decision Making Architecture , Data Management , Managing Knowledge Workers | | 7 | 20 |
| MODULE 6: Knowledge based value chain, Applications of knowledge management, information technology and organizational Productivity, Knowledge management in manufacturing and the service sector, Impact on Organizational Performance | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|----------------------|----------|------|
| 04 ME 7111 | Industrial Relations | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To impart knowledge about Industrial relations and its significance.
2. To develop idea about Labour relations and settlement of disputes
3. To understand roles and responsibilities of trade unions..

Syllabus

Industrial Relations, Employee stability, Industrial Harmony and Conflict, Negotiation, Conciliation, Worker's participation in management, Labour Relations, Trade Unions, Role of Collective Bargaining

Course Outcome:

The student will be able to describe the concepts of industrial relations and the roles of trade unions.

Text Books:

1. Mamoria, C.B, and Sathish Mamoria. (1998). Dynamics of Industrial Relations. Himalaya Publishing House, New Delhi.
2. Dwivedi, R.S. (1997). Human Relations & Organisational Behaviour. Macmillan India Ltd., New Delhi

References:

1. Pylee, M.V, and Simon George. (1995). Industrial Relations and Personnel Management. Vikas Publishing House (P) Ltd, New Delhi.
2. Nair, N.G., and Lata Nair. (2001). Personnel Management and Industrial Relations. S.Chand.
3. Srivastava. (2000). Industrial Relations and Labour Laws. Vikas, 4TH edition.
4. VenkataRatnam, C.S . (2001). Globalisation and Labour Mangement Relations. Response Books.

COURSE PLAN



| COURSE NO. | COURSE TITLE | CREDITS | |
|--|----------------------|---------------|------------------|
| 04 ME 7111 | INDUSTRIAL RELATIONS | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Industrial Relations: The changing concepts of Industrial relations. Factors affecting employee stability. Application of psychology to industrial relations. | | 7 | 15 |
| MODULE 2: Industrial Harmony and Conflict: Harmonious relations in industry, importance and means; cause of industrial disputes, Machinery for settling of disputes. Negotiation, Conciliation, Mediation, Arbitration and Adjudication. Strikes, Lock-outs, Layout and Retrenchment codes of discipline, Grievance procedure, Labour management co-operation; Worker's participation in management. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Labour Relations: Changing concept of management labour relations. Statute laws, Tripartite conventions, development of the idea of social justice. | | 7 | 15 |
| MODULE 4: Limitation of management prerogatives increasing labour responsibility in productivity. Joint Consultation: Principal types. Attitude of trade unions and management; Joint consultation in India. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Trade Unions: Development of trade unionism, Theories of trade unionism, Aim and objectives, Structure and governing of trade unions. Problems of Indian Trade Unions: Political activities, Welfare, Legislation, Responsibilities, positive role in economic and social development. | | 7 | 20 |
| MODULE 6: Role of Collective Bargaining - Methods and tactics, Administration of collective bargaining agreements; Fair and unfair labour practice. Tripartite Machinery: At the center and in the states; I.L.O. – Its functions and role in labour movement – Industrial health and safety; Industrial legislations. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|--------------------------------|----------|------|
| 04 ME 7113 | Integrated Material Management | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand the concept of material handling in industry.
2. To understand the good practices followed internationally.

Syllabus

Materials management, Organizing for materials management, Materials identification, Inventory control, Management of stores, Stores, Purchasing planning, selection and development purchasing procedures, CEI methodology, Sub-contracting.

Course Outcome:

The student will describe the systems and process of material handling in industry.

Text Books:

1. Gopalakrishnan, P. (2001). Purchasing and Materials Management. Tata McGraw-Hill.
2. Ross, D.F. (2003). Distribution Planning and Control: Managing in the Era of Supply Chain Management. Springer

References:

1. Sharma, A.K. (2007). Purchasing and Materials Management. Anmol Publisher.
2. Datta, A.K. (2004). Materials Management: Procedures, Text and Cases. Prentice Hall India.
3. Gopalakrishnan, P., and Sundaresan, M. (2004). Materials Management: An Integrated Approach. Prentice Hall India.
4. Johnson, F., Leenders, M., Flynn, A., and Fearon, H. (2010). Purchasing and Supply Management: Strategies and Applications. Tata McGraw-Hill.



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|--------------------------------|---------------|------------------|
| 04 ME 7113 | INTEGRATED MATERIAL MANAGEMENT | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction, scope of materials management, primary and secondary objectives, integrated materials management. Relation with other functional areas of organization. Organizing for materials management, basis for forming organizations, conventional and modern approaches to organizing materials management. | | 7 | 15 |
| MODULE 2: Materials identification, classifying of materials. Codification of materials, standardization. Simplification and variety reduction of materials | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Inventory control techniques, FSN, VED, ABC. Working capital management with reference to inventory. | | 7 | 15 |
| MODULE 4: Management of stores location different types of stores methods of storing safety and security of materials stores, equipment materials handling equipment factors affecting materials handling. Stores issues and receipts procedures - forms and policies - accounting in stores, organization materials safety and security. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Management of surplus obsolete and scrap materials, accumulation of surplus obsolete and scrap materials methods of disposal regulations and procedures Purchasing planning purchasing materials norms of vendor rating CEI methodology. | | 7 | 20 |
| MODULE 6: Japanese industry, selection and development purchasing procedures and methods legal aspects, sources of supply, out sourcing. Sub-contracting, criteria for selecting sub-contractors rating. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------------------------|----------|------|
| 04 ME 7115 | Heuristics in Decision Making | 3-0-0: 3 | 2015 |

Pre-requisites: Nil

Course Objectives:

1. To understand different non-traditional optimization methods and their applications

Syllabus

Lagrangian relaxation, Genetic algorithms, Simulated annealing, Applications in sequencing and scheduling, Tabu search, Ant colony optimization, particle swarm optimization (PSO)

Course Outcome:

The student will be able formulate problems involved in industrial engineering and solve them using non-traditional optimization techniques

Text Books:

1. Reeves C., "Modern heuristic techniques for combinatorial problems", Orient Longman

References:

1. Gen and Cheng, "Genetic algorithms and engineering design", John Wiley
2. Goldberg, "Genetic algorithms in search, optimization and machine learning", Addison Wesley
3. Dreco, Petrowski, Taillard, "Meta heuristics for hard optimization", Springer
4. Fred Glover, "Tabu search"
5. Dorigo M, Thomas Stutzle, "Ant colony optimization", MIT Press
6. Michalewicz, Fogel, "How to solve it: modern heuristics", ACM Press
7. Maurice Clerc, "Particle swarm optimization", Viva Books Private Limited



COURSE PLAN

| COURSE NO. | COURSE TITLE | CREDITS | |
|---|-------------------------------|---------------|------------------|
| 04 ME 7115 | HEURISTICS OF DECISION MAKING | 3-0-0: 3 | |
| MODULES | | Contact Hours | Sem.Exam Marks;% |
| MODULE 1: Introduction to non-traditional optimization, computational complexity – NP-hard, NP-complete. Overview of exact methods. Lagrangean relaxation: Basic methodology, Lagrangean heuristic and problem reduction, Lagrangean multipliers, applications of Lagrangean relaxation in solving facility location problems, logistics. | | 7 | 15 |
| MODULE 2: Genetic algorithms: Basic concepts, encoding, selection, crossover, mutation - binary GA, Continuous GA, hybrid GA, parallel GA. Application of GA in solving constrained and combinatorial optimization problems, inventory problem, location problem, scheduling problem. | | 7 | 15 |
| FIRST INTERNAL TEST | | | |
| MODULE 3: Simulated annealing: The algorithm, acceptance probability, cooling, neighbourhoods, and cost function. Applications in sequencing and scheduling, travelling salesman problem. | | 7 | 15 |
| MODULE 4: Tabu search: Basic tabu search, neighbourhood, candidate list, short term and long term memory, application of TS in solving facility location problem. | | 7 | 15 |
| SECOND INTERNAL TEST | | | |
| MODULE 5: Ant colony optimization: Basic algorithm, variants, formalization and properties of ACO, Application of ACO to solve travelling salesman problem, vehicle routing problem. | | 7 | 20 |
| MODULE 6: Introduction to particle swarm optimization (PSO), application of PSO in solving transportation problem, portfolio selection, and flow shop scheduling. | | 7 | 20 |



| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------|----------|------|
| 04 ME 7191 | Seminar-II | 0-0-2: 2 | 2015 |

Pre-requisites: Nil

Course Objectives:

Each student shall present a seminar on any topic of interest related to the core / elective courses offered in the M. Tech Programme. He / she shall select the topic based on the references from international journals of repute. They should get the paper approved by the Programme Co-ordinator / Faculty member in charge of the seminar and shall present it in the class. Every student shall participate in the seminar. The students should undertake a detailed study on the topic and submit a report at the end of the semester. Marks will be awarded based on the topic, presentation, participation in the seminar and the report submitted.

| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------------|----------|------|
| 04 ME 7193 | Project (Phase I) | 0-0-2: 2 | 2015 |

Pre-requisites: Nil

In Project Phase-I, the students are expected to select an emerging research area in the field of specialization which is relevant to Industry. After conducting a detailed literature survey, they should compare and analyze research work done and review recent developments in the area and prepare an initial design of the work to be carried out. Emphasis should be given for introduction to the topic, literature survey, and scope of the proposed work along with some preliminary work carried out on the project topic.

Students should submit a copy of Phase-I project report covering the content discussed above and highlighting the features of work to be carried out in Phase-II of the project. The candidate should present the current status of the project work and the assessment will be made on the basis of the work and the presentation, by a panel of internal examiners in which one will be the internal guide. The examiners should give their suggestions in writing to the students so that it should be incorporated in the Phase-II of the project.



SEMESTER 4

Syllabus

| COURSE NO. | COURSE NAME | L-T-P:C | YEAR |
|------------|-------------------|-----------|------|
| 04 ME 7194 | Project (Phase 2) | 0-0-21:12 | 2015 |

Pre-requisites: Nil

In the fourth semester, the student has to continue the project work and after successfully finishing the work, he / she has to submit a detailed bounded project report. The evaluation of M Tech Project will be carried out by a panel of examiners. The work carried out should lead to a publication in a National / International Conference or Journal. The papers received acceptance before the M.Tech evaluation will carry specific weightage.