

M. E. [Industrial Engineering] Syllabi 2013

University of Pune



Faculty of Engineering Board of Production and Industrial Engineering

Master of Engineering

Syllabus *for* Industrial Engineering

Effective from June 2013

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Semester I

Code	Subject	Teaching Scheme	Examination Scheme					Credits	
			Lecture / Practical	Paper Assessment		TW	Oral Presentation /		Total
				In-Semester	End-Semester				
511201	Economics	4	50	50	-	-	100	4	
511202	Work Study & Ergonomics	4	50	50	-	-	100	4	
511203	Optimisation Techniques and Simulation	4	50	50	-	-	100	4	
511204	Environmental Engineering & Energy Resource Management	4	50	50	-	-	100	4	
511205	Elective I	5	50	50	-	-	100	5	
511206	Lab Practice I	4	-	-	50	50	100	4	
Total		25	250	250	50	50	600	25	

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Semester II

Code	Subject	Teaching Scheme	Examination Scheme					Credits	
			Lecture / Practical	Paper Assessment		TW	Oral Presentation /		Total
				In-Semester	End-Semester				
511208	Reliability Engineering & Research Methodology	4	50	50	-	-	100	4	
511209	Costing & Finance	4	50	50	-	-	100	4	
511210	Productivity Management	4	50	50	-	-	100	4	
511211	Elective II	5	50	50	-	-	100	4	
511212	Lab Practice II	4	50	50	-	-	100	5	
511213	Seminar I	4	-	-	50	50	100	4	
Total		25	250	250	50	50	600	25	

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Semester III

Code	Subject	Teaching Scheme	Examination Scheme					Credits	
			Lecture / Practical	Paper		TW	Oral Presentation /		Total
				In-Semester	End-Semester				
611201	Organizational Behavior	4	50	50	-	-	100	4	
611202	Operations Management	4	50	50	-	-	100	4	
611203	Elective III	5	50	50	-	-	100	4	
611204	Seminar II	4	-	-	50	50	100	4	
611205	Project Work Stage I	4	-	-	50	50	100	5	
Total		25	150	150	100	100	500	25	

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Semester IV

Code	Subject	Teaching Scheme	Examination Scheme					Credits	
			Lecture / Practical	Paper		TW	Oral Presentation /		Total
				In-Semester	End-Semester				
611206	Seminar III	5	-	-	50	50	100	5	
611207	Project Work Stage II	20	-	-	150	50	200	20	
Total		25	-	-	200	100	300	25	

Elective I

1. Marketing Management
2. Human Resource Management
3. Entrepreneurship Development
4. World Class Manufacturing

Elective II

1. Facilities Planning
2. Network & Project Management
3. Enterprise Resource Planning & Supply Chain Management
4. Systems Engineering

Elective III

1. Human Factors Engineering
2. Process Planning & Manufacturing Engineering
3. Management of Service Sector
4. Industrial & Commercial Law

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Subject Code: 511201

Economics

Teaching Scheme

[Hours / week]

Lectures: 4

Examination Scheme

[Maximum Marks]

Paper-

In semester: 50

End semester: 50

Credits: 4

Unit I

Basic Concepts of Price Theory, Law of Demand and Elasticity of Demand, Microeconomics: Theory Of Consumer Behavior and demand, law of reducing returns.

Unit II

Competition – types, equilibrium under perfect competition. Macroeconomics: Inflation and Unemployment, Investment demand, Fiscal Policy, Functions of Money

Unit III

Performance of Indian Economy since 1951, Technological changes, Economic growth and development, population, unemployment, poverty; Current Economic Situation, National Product and Income, Consumption, Savings. Foreign Trade, Balance of Payment, Devaluation.

Unit IV

Industrial Development in India – Contribution of Public Sector & Private Sector, problems, sickness reasons and solution, Industrial Policy – Licensing, MRTP and Competition Act, policy for Small Scale, Sector, Disinvestment.

Unit V

International Trade – Composition of Trade, Trends in the international trade, trade deficit, Globalization – advantages and shortcomings, its effect on Indian Economy.

Unit VI

Role of World Bank, IMF, Asian Development Bank, European Union, ASEAN on Indian Economy.

References:

1. S. C. Kuchal, Indian Economy,
2. Dr. S. N. Maheshwari, Financial Management, Sultan Chand & Sons, New Delhi,
3. Dr. R. L. Varshney and Dr. S. Bhashyam, International Financial Management, Sultan Chand & Sons, New Delhi,
4. Karl Case, Ray Fair, Principles of Macro Economics, Feb 2008
ISBN13:9780132322911, ISBN10: 0132322919, Pearson Publication, UK
5. Roger Miller, Understanding Modern Economics, Jan 2008, ISBN13: 9780321245823 ISBN10: 0321245822 Pearson Publication, UK
6. Biplab Dasgupts, Globalisation, Sagar Publications,
7. Edgardo Favaro, Ashok K Lahiri, Fiscal Policies and Sustainable Growth in India, Oxford University Press.
8. Goodwin And Nelson And Ackerman And Weis, Academic Internet Publisher, 142881017X

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Subject Code: 511202

Work Study & Ergonomics

Teaching Schedule:

[Hours / week]

Lectures: 4

Examination Scheme:

[Maximum Marks]

Paper-

In semester: 50

End semester: 50

Credits: 4

Work Study

Unit I

Introduction: Industrial Engineering – Historical Background. Contributions by F. W. Taylor, Frank Gilbreth. Areas of Industrial Engineering, Work content analysis, Basic work content, productivity improvement, Application of Industrial Engineering in service

Unit II

Method Study: Definition, Steps in method study, Need for recording the activities, Symbols used in charting, Recording techniques – Charts and Diagrams, Questioning Technique – Primary and secondary questions, Methods Improvements, Installation of improved method, Principles of motion economy, Work place design

Unit III

Work Measurement: Techniques of work measurement, Time Study, steps in time study, Work Sampling, work sampling plan, rating, synthetic rating, types of elements, elemental breakdown, types of allowances, estimating standard time, Predetermined Time Standards, Methods Time Measurement (MTM), Types of MTM, Introduction to MOST

Ergonomics

Unit IV

Ergonomics: Definition, Scope, Historical background, Human- machine system interfaces, Basic Ergonomics, Work Physiology, Measurement of work, Introduction to Environmental Ergonomics

Unit V

Applied Anthropometry: Definition and scope, Design anthropometry, use of anthropometric data, statistical analysis, Product design and work station design using anthropometric data, Work Space design

Unit VI

Work Physiology: physiological basis of human work performance, energy consumption, biomechanics, mental efforts, psychology of work and work load perception; work environment, postural analysis,

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REBA, RULA.

References:

1. ILO, Introduction to Work study; Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
2. Curie R. M. & Faraday, Work study
3. M. S. Sanders and Ernest J. McCormick, Human Factors Engineering and Design. McGraw Hill
4. E. Grad jean, Fitting Task to the Man.

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Subject Code: 511203

Optimization Techniques and Simulation Modeling

Teaching Schedule:
[Hours / week]
Lectures: 4

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits: 4

Unit I

Introduction to various optimization techniques and models in operations research, Review of LP concepts, Maximization and minimization solution methods.

Unit II

Introduction to Integer programming, problem solving using cutting plane, branch and bound method, introduction to goal programming,

Unit III

Queuing theory: Introduction, classification of queuing models, various models in queuing, problems related to various models, applications of different models in different situations.

Unit IV

Non- linear programming: search methods, stochastic programming, separable programming, fractional programming, decomposition principle, mixed integer programming

Unit V

Simulation: Introduction, continuous and discrete simulation, introduction to discrete event simulation, Monte Carlo Simulation, problem solving for single server model. Calculation of WIP for more than one service stations, inventory simulation.

Unit VI

Introduction to simulation software like ProModel, Witness, etc. Problem solving using any one software

References:

1. Operations Research: Ravindran and Philips, McGraw-Hill, Fifth Edition(1990)
2. Operations Research – An Introduction; 7e, Pearson Education/ PHI – 2002
3. Operations Research; S. Chand & Company Ltd., Ram Nagar, New Delhi

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Subject Code: 511204

Environmental Engineering and Energy Management

Teaching Schedule:

[Hours / week]

Lectures:4

Examination Scheme:

[Maximum Marks]

Paper-

In semester: 50

End semester: 50

Credits-4

Unit I

Introduction: Energy Scenario – global, sub continental and Indian, Energy economy relation, Future energy demand and supply scenario, Integrated energy planning with particular reference to Industrial Sector in India, Captive power units and others – demand v/s supply. The Prevention and Control of Pollution Act, 1974, The Energy Conservation Act, 2001, The Environmental Protection Act, 1986.

Unit II

Physical Aspects of Energy: Classification of energy – Hydel, Thermal, Nuclear, Wind, & from Waste Products, Efficiency and effectiveness of energy utilization in Industry. Energy and energy analysis

Unit III

Legal provisions in Energy Management and its impact: The Energy Conservation Act, 2003, The Electricity Act, 2003, National Electricity Policy. Rural Electrification

Unit IV

Energy Demand Management: Energy utilization, Instrumentation and data analysis, Financial aspects of energy management, Energy management as a separate function and its place in plant management hierarchy.

Unit V

Energy Demand Management: Scope, Methodology, modes of energy savings, Plant energy and utility systems, Efficient energy management – Nine steps – I) Identification ii) Investigation iii) Quantification iv) Decisions v) Presentation vi) Implementation vii) follow-up viii) Set Targets ix) Re-examine; Renewable energy sources.

Unit VI

Energy Audit: Audit and analysis, Energy load measurements, System evaluation and simulation, Energy saving techniques and guidelines: Administrative control, Proper Measurement and monitoring system, Process control, proper planning & scheduling, Increasing capacity utilization, Improving equipment control, waste heat recovery, Change of energy source. Up gradation of Technology, Change of product specifications, Use of High efficiency equipment, Design modification for better efficiency, Improved periodic maintenance; Energy conservation with particular reference to waste heat recovery in different industries; Improvement in combustion system and use of Industrial waste; Co-generation and rational operation of production processes. Case study analysis

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References:

1. Paul W., O'callaghan; Energy Management.
2. Wayne C. Turner; Energy Management Handbook.
3. B.L. Capheart, W.J. Kennedy; Guide to Energy Management.
4. Reay; Industrial Energy Conservation.
5. CII Reports on Indian Energy Management.
6. Murphy W R & Mckay G: Energy Management. Butterworth Heinemann Oxford, 1982.
7. Energy Conservation Act 2001(Act No 52 OF 2001) with short comments, Allahabad Law Publishers (India) Pvt Ltd, 2003.
8. Electricity Act 2003(Act No 36 of 2003) Bare Act with short comments. Professional Book Publishers, New Delhi, 2003.

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Subject Code: 511205 A - Elective I

Marketing Management

Teaching Schedule:
[Hours / week]
Lectures: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits: 5

Unit I

Marketing philosophy of business, an industrial marketing perspective, Understanding and monitoring the environment

Unit II

Understanding consumer's decision processes, analyzing Consumer Behavior, perspectives of organizational buyers in industrial markets, Gathering marketing information, segmenting markets and positioning products,

Unit III

Formulating marketing strategies, planning marketing programmes, managing products, Developing new products, Product development life cycle

Unit IV

Marketing intermediaries, managing market logistics, designing and managing product promotions, Non-profit and social marketing

Unit V

Price theories, Establishing and managing prices, Managing sales force and sales territories, Services marketing, marketing and technological innovations,

Unit VI

Marketing research and its importance, scope, structure and methods, role of quantitative techniques and tools in marketing research.

References:

1. Marketing Management - Philip Kotler
2. Fundamentals of Marketing - Stanton
3. Marketing Management - V.S.Ramaswamy and S.Namakumari
4. Principles of Marketing (9th Edition) - Philip Kotler and Gary Armstrong
5. Marketing - Bovee and John Thill
6. Marketing Models – Lilien, Kotler & Moorthy
7. Case Studies in Marketing - Indian context - R.Srinivas

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Subject Code: 511205 B - Elective I

Human Resource Management

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Human Resources Management - Introduction and Importance - Evolution - Difference between Personnel Management and HRM - Role of HR Manager - Structure of HR Department - Duties and Responsibilities of HR Manager

Unit II

HRD Systems - Evolution - Goals - Elements and their interrelationship - HR Strategies - HR Strategies and Organizational Strategies

Unit III

Manpower Planning - Objectives - Estimating manpower requirement - Recruitment and selection process - Main resources of recruitment - Assessment Devices - Retention of manpower - Succession Planning

Unit IV

Merit Rating - Promotions - Transfers - Job Description - Job Evaluation – Methods of job evaluation, Job Enlargement – Job Enrichment - Job Rotation

Unit V

Training and Development - Training Process and Methodology - Need and objectives – Training Procedure - Methods of Training - Tools and Aids - Evaluation of Training Programmes Performance Appraisal Management System - Definition, Ethics and Concepts of Performance Management - Different methods of Performance Appraisal - Rating Errors

Unit VI

Retirement / Separation - Kinds of Retirement - Resignation, Discharge, Dismissal, Suspension, Retirement, Layoff, Voluntary Retirement / Separation Schemes, Golden handshake. Role of HRD in developing Industrial Relations - Concept - Industrial Democracy - Industrial Peace

References:

1. Human Resource Management - Garry Dessler
2. Personnel Management - C. B. Mamoria
3. Managing Human Resources - R. S. Dwiwedi
4. Human Resource Management - B. P. Michael
5. Human Resource Management - De. P. C. Pardeshi
6. Human Resources Management - Mirza & Saiyadin
7. Managing Human Resources - Arun Monappa

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Subject Code: 511205 C - Elective I

Entrepreneurship Development

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

The Entrepreneurial Development Perspective, Concepts of Entrepreneurship Development, Evolution of the concept of Entrepreneur, Entrepreneur Vs. Entrepreneurship, Entrepreneur Vs. Manager, Attributes and Characteristics of a successful Entrepreneur, Role of Entrepreneur in Indian economy and developing economies with reference to Self-Employment Development, Entrepreneurial Culture

Unit II

Creating Entrepreneurial Venture, Business Planning Process, Environmental Analysis - Search and Scanning, Identifying problems and opportunities, Defining Business Idea, Procedural compliance with respect to Government norms.

Unit III

Project Management - Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and Financing funds requirement - Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs, Venture Capital Funding

Unit IV

Entrepreneurship Development and Government, Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available, Role of following agencies in the Entrepreneurship Development - District Industries Centers (DIC),

Unit V

Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB)

Unit VI

Why do Entrepreneurs fail - The FOUR Entrepreneurial Pitfalls, (Peter Drucker), Women entrepreneurs, Reasons for Low / No Women Entrepreneurs, Role, Problems and Prospects. Case studies of Successful Entrepreneurial Ventures, Failed Entrepreneurial Ventures and Turnaround Ventures

References:

1. Entrepreneurship: New Venture Creation - David H. Holt
3. The Culture of Entrepreneurship - Brigitte Berger
4. Project Management - K. Nagarajan
5. Dynamics of Entrepreneurship Development - Vasant Desai

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6. Entrepreneurship Development - Dr. P.C.Shejwalkar
8. Entrepreneurship, 3rd Ed. - Steven Brandt
9. Business Gurus Speak - S.N.Chary

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Subject Code: 511205 D - Elective I

World Class Manufacturing

Teaching Schedule:
[Hours / week]
Lectures:5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits:5

Unit I

Industrial Decline and Ascendancy Manufacturing excellence - US Manufacturers - French Manufacturers - Japan decade - American decade - Global decade

Unit II

Building strength through customer - Focused principles Customer - Focused principles - General principles - Design - Operations - Human resources – Quality and Process improvement - Promotion and Marketing

Unit III

Value and Valuation, Product Costing - Motivation to improve - Value of the enterprises Quality The Organization: Bulwark of stability and effectiveness - Employee stability - Quality Individuals Vs. Teams - Team stability and cohesiveness - Project cohesiveness and stability

Unit IV

Strategic Linkages Product decisions and customer service - Multi-company planning - Internal manufacturing planning - Soothing the demand turbulence. Introduction to Biotechnology and Nanotechnology.

Unit V

Models of world class manufacturing - Hall's framework of value –added engineering , Schonberger,s framework of world class manufacturing, Various models of world class manufacturing - JIPM , TPM , EFQM Award, RBNQA Award , Lean Manufacturing & Services, Lean Mfg tools, Value Stream Mapping

Unit V

Impediments, Bad plant design - Mismanagement of capacity - Production Lines - Assembly Lines - Whole Plant Remaking Human Resource Management, Associates - Facilitators - Teamsmanship - Motivation and reward in the age of continuous improvement

References:

1. Operations Management for Competitive Advantage - Chase
2. Making Common Sense Common Practice - Moore
3. Managing Technology & Innovation for Competitive Advantage - Narayanan
4. Just In Time Manufacturing - M.G.Korgaonkar
5. World Class Manufacturing - B.S.Sahay
6. World Class Manufacturing – Schonberger
7. Soichio Nagashima, 100 Management Charts, Asian Productivity Press, Tokyo

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Subject Code: 511206

Lab Practice I

Teaching Schedule:
[Hours / week]
Practical: 4

Examination Scheme:
[Maximum Marks]
TW: 50
Oral: 50
Credits:4

During these 4 hours per week, student is expected to undertake two assignments each from the three compulsory subjects and one assignment each from the two elective subjects. The topics as given below.

Performance will be valuated both on the basis of submission and oral.

Economics:

1. Law of Demand and Elasticity of Demand
2. Current Economic Situation
3. International Trade

Work Study and Ergonomics:

1. Work content analysis including Rating Concept as well as REBA and RULA
2. Time Study using Stop Watch as well as Pre-determined Time Standard
3. Application of Ergonomics

Optimisation Techniques:

1. Problem solving using cutting plane, branch and bound method, introduction to goal programming,
2. Various models in queuing,
3. Simulation using simulation software like ProModel, Witness, etc.

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Subject Code: 511208

Reliability Engineering & Research Methodology

Teaching Schedule:
[Hours / week]
Lectures:4

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits: 4

UNIT I

Concept of quality, Deming Ishikwa and Juran's approach towards quality, quality of design, conformance and performance, quality policy, quality costs, TQM, QFD, six sigma.

UNIT II

Statistical techniques in quality control, Variation in processes-Factors-Process capability-Analysis of process capability-control-charts-variables- Attributes-Establishing and interpreting control charts-X,R, ,chart for variables-defects-P chart and U chart- Control charts for Defectives and quality rating. Design of experiment, Taguchi philosophy.

UNIT III

Acceptance sampling, Lot-by-lot sampling-types-probability of acceptance in single, double, multiple sampling techniques-O.C. curves producer's Risk and consumer's Risk AQL, LTPD, AOQL concepts-standard sampling plans for AQL and LTPD-uses of standard sampling plans.

UNIT IV

Reliability, Importance of reliability, performance cost and reliability, quality and safety, system configuration with examples, stochastic processes, bathtub concept, MTBF, MTTR, hazard rate, failure rate, probability and sampling, cumulative probability distribution function, data and distributions.

UNIT V

Reliability system approach, System reliability-series and parallel systems-system reliability in terms of probability of failure-MTBF-Acceptance sampling based on reliability test-OC curves Active and Passive Redundancy, redundancy allocation and limitations, Evaluation of overall system reliability, Conditional probability, Matrix methods, set theory analysis of system reliability.

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UNIT VI

Reliability and safety factors, Repetitive loading, Preventive maintenance, Testing and repair, reliability centered maintenance, system availability and maintainability. Life testing-objective-classification-failure characteristics-failure data analysis-mean time to failure .

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References:-

1. Juran, Quality Control Handbook
2. Kaoru Ishikawa, Guide to Quality Control
3. Amtava Mitra, Quality Control and Improvement
4. Shrinath, Reliability Engineering
- 5 Basu S. K., Terotechnology -Reliability Engineering and Maintenance

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M. E. – Industrial Engineering 2013 Subject Code: 511209 Costing and Finance

Teaching Schedule:
[Hours / week]
Lectures:4

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits: 4

Unit I

Costing, Significance of Costing for Engineers. Limitations of Financial Accounting, Corporate Objectives - Profitability and other objectives. Product Services and Market Mix. Elements of Cost – Material, Labour, Expenses. Overheads. Direct and Indirect Cost, Fixed and Variable cost, other classifications.

Unit II

Cost Allocation: Cost Accumulation and Allocation. Cost allocation of Service departments, Reciprocal Method, allotting cost from one department to other. Depreciation as a cost – various methods of calculation, Joint and by-product cost – Joint cost problems. Treatment of by-product costs. Decision making with joint products. Cost-Volume-Profit Analysis - Assumptions, determination of break-even point, CVP under multiple products.

Unit III

Marginal Costing: Use of Marginal costing in decision-making. Activity Based Costing: Concept. Cost Drivers. Applications. Process Costing: Concept. Transfer Cost. Concept of by-products, scrap, waste, losses. Cost Control as a Management Tool: Standard Costing: concept. Development and use of Standard Costing. Budget and Budgetary Control, Variance Analysis. Target Costing.

Unit IV

Introduction: Finance Function – scope, Goals of Financial Management. Sources of Financial Information. Corporate Planning & Financial Management: Objectives & goals, Goals of Top Management, Capital Expenditure & Corporate Planning. Financial Forecasting & Cash Management, Financial Forecasting: Tools- pro-forma financial statement, Cash Budget, Reconciliation of pro forma financial statement & cash budget. Managing Cash: inflow & outflow. Investing surplus cash. Management of Short Term Finance: Working Capital Management, Accounts Receivable

Unit V

Tools of Financial Management - Funds Flow Analysis: Concept, Objectives. Technique of Funds Flow Statement. Ratio Analysis: Classification of Ratios: Structural group, Turnover group, Standards for Comparison; limitations of Ratio Analysis, Return on Investment an Integral Ratio. Cost-Volume-Profit Analysis: Mechanics of break-even Chart. Profit planning & breakeven Analysis. Margin of Safety. Operating & Financial Leverage: Effects of Leverages on Variability of Earnings, Leverage

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Unit VI

Working Capital Management of Term Loans: Raising the Loans, Term Loan Appraisal, Security, Effective Negotiations, Allocation of Resources: Capital Budgeting-Control of Capital Expenditure, Evaluation Process-Payback approach, Accounting of Rate of Return, Present Value Method Vs Internal Rate of Return, Cost of Capital: Relevant Cost. Measurement of Cost of Capital, Cost of Debt, Preference Shares, Equity Shares. Internal Financing: Dividends Cost of Retained Earnings Concept.

References:

1. Henry M. Steiner, Engineering Economic Principles
2. C. B. Gupta, Fundamentals of Business, Sultan Chand & Co.
3. P. A. Samuelson, Economics, McGraw Hill International.
4. K. K. Dewett, Modern Economic Theory, Sultan Chand & Co.
5. S. C. Shukla, T. S. Grewal; Advanced Accounts, S. Chand and Sons, New Delhi
6. Bhar B. K.; Costing.
7. Prasad N. K.; Cost Accounting, Book Syndicate Pvt. Ltd., Calcutta
8. Colin Drury; Management and Cost Accounting, English Language Book Society, Chapman & Hall, London EC 4 P 4EE. [ISBN 0 412 34120 4]

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Subject Code: 511210 Productivity Management

Teaching Schedule:
[Hours / week]
Lectures:4

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits: 4

UNIT I

Productivity concepts - Macro and Micro factors of productivity, Productivity benefit model, productivity cycle. Productivity measurement at International, National and Organisational level, Total productivity models.

UNIT II

Productivity models, Productivity management in manufacturing and service sector. Productivity evaluation models, Productivity improvement models and techniques.

UNIT III

Principles of organizational transformation and re-engineering, fundamentals of process reengineering, preparing the workforce for transformation and reengineering, methodology, guidelines, DSMCQ and PMP model.

UNIT IV

Re- engineering process improvement model, PMI models, Edosomwan model, Moen and Nolan strategy for process improvement, LMICIP model, NPRDC model. Analytical and process tools and techniques, Information and communication technology, role of IT.

UNIT V

Re – engineering tools and implementation, Re-opportunities, process redesign - cases. Software methods in BPR - specification of BP, case study - Order, processing, user interfaces, maintainability and reusability.

UNIT VI

Productivity improvement techniques, Productivity management cycle, problems and prospects in Indian Industries; Application of conventional Industrial Engineering techniques for productivity improvement. Incentive Plans, Job Evaluation. Business Process reengineering. Quality Management- Evolution, Contributions of Juran, Deming, and Crosby; Quality control tools and techniques, Six Sigma, TQM, ISO Certification.

References:

1. The new Manufacturing Architecture – Mahadevan
2. Productivity Management – Sumant
3. Reengineering the Business Corporation – Micheal Hammer & Champy, Productivity Press
4. The Lean Thinking – James Womack and Daniel Jones, Productivity Press
5. Toyota Production System – Shigeo Shingo, Productivity Press

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Subject Code: 511211 A – Elective II

Facilities Planning

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Facilities planning and industrial engineers-An overview, Facilities planning and supply chain management, Facilities planning and Engineering economic analysis, Facilities location problems-application of various analytical approaches, single/multiple facility location problems, Discrete/continuous location problems, Quadratic assignment problems, minimax location problems and covering problems.

Unit II

Facilities design problems-Structural design, layout design including computerized layout planning and handling system design. Warehouse Management,

Unit III

Application of classical industrial engineering concepts to facilities planning-Work system design including method study and ergonomics; Value engineering.

Unit IV

Business Process Reengineering, Value added management, Management System Audit.

Unit V

Appreciation of issues related to facilities planning in conventional and new manufacturing systems. Appreciation of issues related to facilities planning in the context of management of technology. Appreciation of the relationships between competitive strategies, building core competence and facilities planning,

Unit VI

Facilities planning and TPM / TQM, Case studies using various concepts and techniques of Operations Research. Facilities planning in service sector. Role of SGA's like KAIZEN, QC and POKA YOKE in facilities planning.

References:

1. R.L Francis and J.A White (1974), Facilities layout and location-An analytical approach, Prentice Hall Inc.
2. J.A Tomkins and J.A White (1984), Facilities Planning, John Wiley & sons.
3. M.E Porter (1985), Competitive Advantage, The Free Press.
4. D.K. Carr and H.J Johansson (1995), Best practices in Reengineering, McGraw Hill, Inc.
5. K.K.Humphreys (1991), Jelen's Cost and Optimization Engineering, McGraw Hill,International.
6. P.Cheekland (1981), Systems thinking, Systems Practice, John Wiley & sons.

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Subject Code: 511211 B – Elective II

Network and Project Management

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Introduction to Networks, deriving networks on the basis of graph theory, Maximal flow minimal cut theorem, applications of networks in operations research.

Unit II

Various models in OR which can be solved using networks techniques.

Unit III

Multi-terminal Maximal flows, Multi-terminal shortest paths. Multi commodity flows. Synthesis of networks. The general minimal cost flow problem, Minimal cost calculation, Network simplex Method.

Unit IV

Matching problems and the bottleneck assignment problem. Application to vehicle routing problems.

Unit V

Determination of size and schedules for transportation fleets.
Synchronization of signalized interactions, Project Scheduling with resource constraints,

Unit VI

Network flows in the economy, Input-output analysis.

References:

1. A. Ravindran; Operations Research And Management Science Handbook; CRC Press, 2008
2. R. T. Rockafellar (1984), Network Flows and Monotropic Optimization, Wiley.
3. R. K. Ahuja, T. L. Magnanti, and J. B. Orlin (1993), Network Flows: Theory Algorithms and Applications, Prentice Hall.
4. M. S. Bazaraa, J. J. Jarvis, and H. D. Sherali (1990), Linear Programming and Network Flows, 2nd Edition, John Wiley, New York.
5. L. R. Ford, and D. R. Fulkerson (1962), Flow in Networks, Princeton University Press, Princeton

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013
Subject Code: 511211 C – Elective II
Enterprise Resource Planning and Supply Chain Management

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Evolution of ERP – Removal of distance and time, paperless management, Concept of MRP1, MRP2, ERP 1, ERP 2. Introduction to ERP software like SAP, BAAN, ORACLE, Modules in ERP

Unit II

Logistics - Concept and significance - Distribution Strategies - Customer Service policies and Integrated Logistics Management. Transportation Alternatives - Railway, Road, Air, Waterways, Pipe Lines, Animals and Animal driven vehicles - Economics of transportation –

Unit III

Applications of Quantitative Techniques - Transportation Models Distribution Network Planning system - Location - Number and size of facilities – Stocking Policies, Storage and handling capacities - Introduction to State and Central Warehouse Acts like Packaging Commodities Order under the Weights and Measures Act.

Unit IV

Packaging - Principles, functions and types - Containerization - Concepts - Infrastructure - Customs Issues - Service Utilization Modes - Rail, Sea and Road. Role of Freight and Insurance in Logistics

Unit V

Concept of Supply Chain Management and its strategic role in the organization - Intra and Inter Organization Supply Chain, Designing of efficient supply chain policies - Bottlenecks and remedies

Unit VI

Integration of supply chain with corporate strategy - Cost efficiency across supply chain – Impact on Customer Service. Role of computer and IT in supply chain

References:

1. Purchasing & Supply Management - Dobler and Burt; McGraw-Hill, 1996
2. Strategic Logistics Management – Lambert
3. Logistical Management - The Integrated Supply Chain Process – Bowersox
4. Logistics & Supply Chain Management – Christopher
5. Supply Chain Management - Sunil Chopra
6. Logistics & Supply Chain Management – Raghuram
7. Supply Chain Management for 21st Century – Sahay
8. The Weights and Measures Act.

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 511211 D – Elective II

Systems Engineering

Teaching Schedule:
[Hours / week]
Lectures:5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits: 5

Unit I

History and evolution of software engineering: software engineering as a discipline, Information systems and their ramifications.

Unit II

Software development life cycles: waterfall, prototyping, incremental, spiral, concurrent, reuse, and formal models.

Unit III

Requirement analysis, user requirements, functional and non-functional requirements, tools for requirement analysis, document flow charts, decision tables, data flow diagrams, data dictionaries, Tools for analysing real time systems, Use case diagrams, system sequence diagrams, CRC card,

Unit IV

Software requirement specification, Software design: the design process, function-oriented design, data base oriented design, object oriented design, data base design, user interface design, output design. Coding: Code documentation, data declaration, statement construction, guidelines for input/output, efficiency with regard to code, memory and input/output.

Unit V

Testing: Unit testing, black box and white box testing, program flow graphs, test cases, integration testing, top-down and bottom-up testing, validation testing, alpha and beta testing, system testing, security testing, performance testing.

Unit VI

Maintenance: software reliability, availability, and maintainability, Reliability models. Legal Issues; Hardware and Software Acquisition procedures.

References:

1. Software Engineering: Roger S. Pressman, Prentice Hall, 5th Edition.
2. Systems Engineering: Davis and Olson

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 511212

Lab Practice II

Teaching Schedule:
[Hours / week]
Practical: 4

Examination Scheme:
[Maximum Marks]
TW: 50
Oral: 50
Credits-5

During these 4 hours per week, student is expected to undertake two assignments each from the three compulsory subjects and one assignment each from the two elective subjects. Performance will be evaluated both on the basis of submission and oral.

The assignment topics are as follows:

Reliability Engineering:

1. Deming Ishikwa and Juran's approach towards quality
2. Statistical techniques in quality control
3. MTBF, MTTR, hazard rate, failure rate, probability and sampling,

Costing and Finance:

1. Preparation of costing of a product or service
2. Application of Marginal Costing in decision making
3. Analysis of annual results of an organisation

Productivity Management:

1. Productivity evaluation model
2. Re- engineering process improvement model
3. Application of conventional Industrial Engineering techniques for productivity improvement

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 511213

Seminar I

Teaching Schedule:
[Hours / week]
Practical: 4

Examination Scheme:
[Maximum Marks]
TW: 50
Oral: 50
Credits:4

A student is expected to select a topic relevant to any area of Industrial Engineering, but the topic should not be directly related to any of the subjects being covered in this semester. The seminar should be either based upon research material published elsewhere or on case studies.

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 611201

Organizational Behavior

Teaching Schedule:
[Hours / week]
Lectures:4

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits-4

Unit I

Necessity of organizational changes and managing changes in order to make the organization competitive,

Unit II

Organizational change, dilemma of change, pressure for change, Types of changes, force field analysis, change process, resistance to change, overcoming the resistance to change, theories of change

Unit III

Organizational Development and Behavior, definition, characteristics, objectives and values, management development and process

Unit IV

Sensitivity training, T groups, team building, survey feedback, grid training Testing: Unit testing, black box and white box testing, program flow graphs, test cases,

Unit V

Integration testing, top-down and bottom-up testing, validation testing, alpha and beta testing, system testing, security testing, performance testing.

Unit VI

MBO Techniques, system 4 – management, Process consultation, case studies

References-

1. Organisational Behavior – Fred Luthans, McGraw Hill Publication
2. Organisational Behavior – Hellrigel, Solcum, Woodman, South Western Publication
3. Organisational Behavior – Robbins S.P., Prentice Hall Publication
4. Organisational Behavior – Luthans, Fred, McGraw Hill Publication
5. Organisational Development and Change – Cummings and Worley, South Western Publication
6. Organisational Development – W.L. French, Pearson Education

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 611202

Operations Management

Teaching Schedule:
[Hours / week]
Lectures:4

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits-4

Unit I

History and development of Manufacturing Management - Contribution of various pioneers beginning from Division of Labour to Quality Revolution and Environmental Control

Unit II

Operations Management an integrated approach, Operations Management an integrated approach Concurrent Engineering, Product Development Life Cycle, Types of production systems, Plant location – analysis, Plant Layout – Types & Techniques

Unit III

Production Planning & Control, Concept of Production planning, Production scheduling techniques, Introduction to Production Planning & Control - Scheduling - Gantt Charts - Documentation – Production Work Order, Line Balancing technique, Intro to PERT/CPM, Maintenance planning, Concept of TPM, 5S, OEE

Unit IV

Manufacturing Management - Nature, Scope, Importance and Functions, Methods of Manufacturing - Project / Jobbing, Batch Production, Flow / Continuous Production, Process Production - Characteristics of each method, Plant Location - Importance - Factors affecting location - Factory Building - Plant Layout - Installation of facilities

Unit V

Introduction to PERT / CPM - Importance in Manufacturing Management - Network Crashing
Maintenance Management - Importance and types of maintenance - Maintenance Planning - Spare Parts Management - Equipment Replacement problem,

Unit VI

Inspection - Cent percent Inspection, Sample Inspection, Operation Characteristics Curves, Statistical Quality Control - Control Charts - X-R Charts, Process Capability, Work Measurement, Allowances, Methods of Remuneration, Time Based and Efficiency Based - Incentive Schemes - Individual (Halsey, Rowan and Taylor) and Group Incentive Schemes

References

1. Operations Management, 5th Ed. - Krajewski
2. Production & Operations Management – Chary, McGraw Hill Publications,
3. Production & Operations Management – Chase, Pearson Publications
4. Production & Operations Management – Panneerselvam, McGraw Hill Publications,

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 611203 A – Elective III

Human Factors Engineering

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Introduction to Human Factors, A. Human criteria's, human physical activities, features of the human body, Measures of physiological functions such as: energy expenditure, gross body activity, local muscular activity, work load, work efficiency, work and rest. Type of movements of body members. manual material handling (MMH), Performance criteria for physical activity such as: Strength & endurance, speed of movements, accuracy of movements

Unit II

Applied Anthropometry and Work Space design, Introduction to anthropometry, use & principles of anthropometry data, work spaces, work space envelopes for seated persons, design of work spaces such as: work surface height, seated & standing, principles of seat design, workplace design. Design and Displays: Information input & processing, visual displays of static & dynamic information. Auditory, textual & olfactory displays, general location of controls & displays within workspace, concept of visibility, Physical space & arrangement, principles of arrangement of component, Functions of controls, types of controls, factors in control design, design of specific hand operated controls, foot controls and special control devices.

Unit III

Working Conditions, Illumination: Color systems, energy consideration, Atmospheric conditions: Measurement of thermal variables, wet-bulb globe temperature, heat stress index, heat index, wind chill index, Noise: Physiological effect of noise on performance, noise exposure limits, Effect of lighting on performance. Physiological effect of heat & cold on performance, Noise controls.

Unit IV

Energy Expenditure, Muscle mechanism, BMR, Heart Rate variations, Oxygen consumption, Rest Allowances, Rate of energy expenditure, Manual Material Handling Capacity determination, Effect of environmental conditions and work design on Energy Expenditure

Unit V

Ergonomics and Work Organization, Human factors applications in system design, characteristics of system design, human factors data for interface design, ergonomic safety & health management, Case studies of ergonomically designed product.

References:

1. ILO, Introduction to Work study
2. Curie R. M. & Faraday, Work study
3. M. S. Sanders and Ernest J. McCormick, Human Factors Engineering and Design. McGraw Hill
4. E Grad jean, Fitting Task to the Man.
5. The Factories Act, 1948.

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013 Subject Code: 611203 B – Elective III

Process Planning and Manufacturing Engineering

Teaching Schedule:

[Hours / week]

Lectures:5

Credits: 5

Examination Scheme:

[Maximum Marks]

Paper-

In semester: 50

End semester: 50

Unit I

Introduction to metal casting, types of patterns, their materials and allowances. Types of Moulds, Elements of Gating systems and Risers and their design, Cupola and its operation, Casting Processes, casting defects, their causes and remedies. Welding: Introduction and classification of welding processes, welding terms (terminology), general principles, welding positions, joint design and filler metals. Introduction to different Welding Processes.

Unit II

Machining Processes, Lathe machine and its operations, Milling Machine and its operations, Drilling machine and its operations, Shaper, planer and Slotting machine and its operations, Grinding Machines and Press working, Material Forming - Classification of metal forming processes, hot and cold working processes- their advantages and disadvantages. Introduction to material forming processes like Rolling, Forging, Extrusion, Tube and Wire Drawing, Sheet metal working.

Unit III

Product Engineering, Concept of a product – Its elements, units, subassemblies and assemblies, scope of product engineering function, Flow charts of assemblies, Product analysis and planning: Design for Manufacturing and assembly (DFMA). Product selection and criteria of Product acceptability based on market research.

Unit IV

Process Engineering, Organizational activities, functional activities, relation with other departments, classification of processes, manufacturing operations, operational elements - machining, handling, setting, inspection and approach for selecting and planning a process: determining machining sequences - criteria, classification of operations and manufacturing sequence, criteria for analysis for selection of best process. Selection of proper Equipment, Process capability of Equipments, prime accuracies and producible accuracies of Equipments,

Unit V

Factors influencing make or buy decisions, relation between Process selection and Machine selection, basic factors in machine selection in terms of cost and design factors, Determining machining conditions and computing manufacturing times. Selection of Tooling, Factors affecting selection of Tooling, commercial tooling, special tooling, selection of Tools: jigs, fixtures, gauges, form tool in relation to process selected. Use of multi-tooling set up, tooling economics as applied to Process Engineering. Stock preparations and blank selection with material estimates.

Unit VI

Process Sheet design, Study of the parts to be processed, Logical design of a process plan, stock preparations, blank selection with material estimates, Selection of datum features, identification of machining surfaces, incorporation of dimensions including tolerance analysis, selection of machining methods with time estimates and time standard for each operation, Process Picture sheet including process symbols, processing dimensions. Process sheet design for complete manufacturing part

M. E. [Industrial Engineering] Syllabi 2013

References:

1. R.K Jain, Production Technology, Khanna Publication.
2. O.P. Khanna, Production Technology, Dhanpat Rai Publication.
3. Kalpacjian, Manufacturing Technology.
4. Dieter, Mechanical Metallurgy
5. P.N. Rao, Manufacturing Technology, Tata McGraw Hill
6. G.W. Rowe, Principles of industrial metal working process, Edward Arnold
7. D. F. Eary, G. E Johnson, "Process Engineering for Manufacturing", Prentice Hall of India Pvt. Ltd.

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 611203 C – Elective III

Management of Service Sector

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Transport - Rail, Road, Sea and Air transport - features, advantages and limitations Importance of transport in Business, Warehousing, Meaning and need for warehousing, Types of warehouses, Characteristics of an ideal warehouse, Functions of warehousing, Advantages of warehousing

Unit II

Communication, Meaning and importance, Types of Communication, Postal Services - Nature of Postal Services, Services provided by Post Office, Importance of Post Services, Banking and Insurance, Promissory Note, Cheque, Insurance -Business risks, Concept and importance of Insurance, Types of Insurance – Life, -General - Fire, Marine and other types, Principles of Insurance

Unit III

Healthcare in India, Strategies for globalization, Marketing of Integrated health care unit. Marketing of hospital services, Total quality management in hospitals. Ethics and values, Biomedical waste management, Marketing Practices in corporate hospitals and appraisal. Prospects of herbal formulation and export potential

Unit IV

Selling and Distribution, Purchase and Sale - Concept of purchasing and selling Types: Cash, Credit, Hire Purchase System and Installment Payment System, Documents used in the process of purchase and sale; Channels of Distribution - Concept of channels of distribution, Direct and indirect channels of distribution, Role of wholesalers and retailers in the process of distribution, Types of retail trade- small scale and large scale

Unit V

Large-scale Retail Trade, Forms of large scale retail trade - Departmental Store, Super Bazaar, Multiple shops Non-store retailing-Mail order business, Tele-shopping, Automated vending machine, selling through Internet

Unit VI

Personal Selling, Meaning and Importance, Qualities of a successful salesman, Advertising, Meaning and importance, Media of advertising, Sales Promotion, Meaning and Importance, Tools of sales promotion, Entrepreneurship, Concept and Importance, Qualities of a successful Entrepreneur, Functions of an Entrepreneur, How to start a small Business Enterprise

M. E. [Industrial Engineering] Syllabi 2013

References:

1. Robert G. Cooper, Scott J. Edgett, Product Development for the Service Sector: Lessons from Market Leaders, Published 1999, Perseus Books, ISBN 0738201057
2. Mike Asher, Managing Quality in the Service Sector, 1996, ISBN 0749419547
3. Service Sector in Indian Economy edited by Talluru Sreenivas, New Delhi, Discovery Pub., 2006, ISBN 81-8356-050-4.
4. Jan Owen Jansson, The Economics of Services. Development and Policy Edward Elgar Publishing (2006), ISBN: 9781845423971
5. Dieter Spath Editor, Advances in Services Innovations, Springer (2006), ISBN: 9783540298588
6. Peter W. Daniels Tom Hutton Kong Chong Ho, Service Industries and Asia Pacific Cities. New Development Trajectories, Taylor & Francis Group (2005), ISBN: 9780415327497

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013 Subject Code: 611203 D – Elective III Industrial and Commercial Law

Teaching Schedule:
[Hours / week]
Lectures:5
Credits: 5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50

Unit I

Industrial Laws, The Industrial Disputes Act, 1947, Extent. Works Committee, Conciliation Officers, Board of Conciliation, Court of Inquiry, Labour Courts, Tribunals, National Tribunal. Procedure, power and duties of the authorities. Strikes and lockouts, layoffs and retrenchment, closure. Unfair labour practices, Penalties.

Unit II

The Trade Union Act 1926, Formation of Trade Unions, Collective bargaining capacity, The Industrial Employment [Standing Orders] Act, 1946 (20 of 1946). Draft Standing Orders, conditions for certification of Standing Orders, Appeals, Register of Standing Orders, Temporary application of model standing orders.

Unit III

The Factories Act, 1948, Health, Safety, Provisions relating to Hazardous Processes, Welfare, Working Hours of Adults, Employment of young persons, Annual Leave with wages.

Unit IV

The Employees' Provident Fund & Miscellaneous Provisions Act, 1952 (10 of 1952), Employee's Provident Fund Schemes, Central Board, Employee's Pension Scheme, Employee's Deposit Linked Insurance Scheme, Contributions.

Unit V

Commercial Acts: The Monopolies and Restrictive Trade Practices Act, 1969 (54 of 1969) & The Monopolies and Restrictive Trade Practices Commission, unfair and restrictive trade practices. The Competition Act, 2002. Competition Commission, Anti competitive agreements, relevant markets,

Unit VI

The Sale of Goods Act, 1930 (3 of 1930), Contract of Sale, Formalities of Contract, Subject Matter of Contract, the Price, Conditions and Warranties. Transfer of Property as between seller and buyer, Transfer of title.

References:

1. Pramod Verma, Management of Industrial Relations, Oxford and IBH Publishing Co., Mumbai.
2. C. Jagamohandas and Co., Mumbai – Publications of Acts with short notes.
3. Bare Acts,
4. Taxman Publications for the Acts

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 611203 E – Elective III- Open elective

Product Design and Intellectual Property Rights

Teaching Schedule:
[Hours / week]
Lectures:5

Examination Scheme:
[Maximum Marks]
Paper-
In semester: 50
End semester: 50
Credits-4

Unit I

Visual Design, Basic elements and concept of visual design-line color, balance proportion, size and shape, mass, unity and variety, special relationships and composition in two and three dimensions.
Form & Color

Unit II

Elementary forms their characteristics and significance in design. Form transition, Form in relation to ergonomics, material and manufacturing process, color as an element of design, color clarification dynamics, interrelation of colors, colors and traditions; Psychological use of color form and material.

Unit III

Product Graphics, Meaning and objectives of product graphics, Basic principles of graphic design, Visual communication aspects of product graphics, Graphics of displays and control panels,

Unit IV

Product Detailing

Standard fastening and joining details in different materials; Temporary and permanent joints: Detailing for plastic products, Detailing for fabricated products in sheet metal.

Unit V

Product Development, Definition and objective, Role of designer in product development, Manufacturing and economic aspects of product development, Product promotions, product developments.

Unit VI

Intellectual Properties Right, Definition and Objective, issues involved with IPR, Patent, copyright and Trademark, difference between them. Patent Search, European databases, American Databases. Accessing free and paid sights, International patent classification, Procedure for filing patent. Legal issues involved.

References:

1. Mayall W.H., "Industrial Design for Engineers" London Liifce Books Ltd. 1967
2. Dale Huchingson R "New Horizons for Human Factors in Design " McGraw Hill Company 1981
3. Mayall W. H, " Principles in Design"
4. Svensson, "Engineering Design"
5. Matousek, "Engineering Design"
6. McCormick K.J. (Ed) "Human Factor Engineering " (4th edition) McGraw Hill Book Company Ltd. USA 1992
7. Patent sights - USPTOV.GOV , Espacenet.com

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013
Subject Code: 611204
Seminar II

Teaching Schedule:
[Hours / week]
Practical: 4

Examination Scheme:
[Maximum Marks]
TW: 50
Oral: 50
Credits-4

A student is expected to select a topic relevant to any area of Industrial Engineering, but the topic should not be directly related to any of the subjects being covered in this semester. The topic of the seminar may be related to the proposed Project Work a student is expected to undertake. The seminar should be either based upon research material published elsewhere or on case studies.

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013
Subject Code: 611205
Project Stage I

Teaching Schedule:
[Hours / week]
Practical: 4

Examination Scheme:
[Maximum Marks]
TW: 50
Oral: 50
Credits-5

Student has to submit a report based upon the following:

- Original Objective of the Project
- Progress Achieved
- Difficulties encountered
- Conclusions, if any
- Future plan of action

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013
Subject Code: 611206
Seminar III

Teaching Schedule:
[Hours / week]
Practical: 4

Examination Scheme:
[Maximum Marks]
TW: 50
Oral: 50
Credits-5

A student is expected to select a topic relevant to any area of Industrial Engineering, but the topic should not be directly related to any of the subjects being covered in this semester. The topic of the seminar may be related to the proposed Project Work a student is expected to undertake. The seminar should be either based upon research material published elsewhere or on case studies.

M. E. [Industrial Engineering] Syllabi 2013

M. E. – Industrial Engineering 2013

Subject Code: 611207

Project Stage II

Teaching Schedule:
[Hours / week]
Practical: 20

Examination Scheme:
[Maximum Marks]
TW: 150
Oral: 50
Credits: 20

Student has to submit a report based upon the following:

- Need and scope of the project -Problem identification and statement
- Methodology
- Data collection
- Data Analysis
- Improvements and solution of the problem identified
- Results- benefits of improved solution
- Conclusions
- Future scope of the project