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TOTAL NUMBER OF CREDITS TO BE EARNED FOR AWARD OF THE DEGREE: 71

ELECTIVES FOR M.E. INDUSTRIAL ENGINEERING

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IL8101  OPTIMISATION METHODS

UNIT I  INTRODUCTION-LP
Concepts of OR, development, applications, LP Definitions, assumptions, formulation, graphical method, Simplex algorithm.

UNIT II  LP-EXTENSIONS
Duality- primal dual relationships -Dual Simplex — sensitivity analysis, Data Envelopment Analysis.

UNIT III  NETWORKS
Transportation, Assignment, Maximal flow, Shortest route, Spanning tree problems, Project Network.

UNIT IV  DYNAMIC PROGRAMMING
Dynamic Programming-Concepts, formulation, recursive approach; applications

UNIT V  WAITNG LINES
Queueing characteristics and terminology, poisson and non-poisson models.

REFERENCES:

TOTAL: 60 PERIODS

IL8102  WORK DESIGN AND ERGONOMICS

UNIT I  METHOD STUDY
Work design and Productivity – Productivity measurement - Total work content, Developing methods – operation analysis, motion & micro motion study, graphic tools.

UNIT II  WORK MEASUREMENT
Stop watch time study, Performance rating, allowances, standard data-machining times for basic operations, learning effect

UNIT III  APPLIED WORK MEASUREMENT
Methods time measurement (MTM), Work sampling, organization and methods (O & M), Wage incentive plans.

UNIT IV  PHYSICAL ERGONOMICS
Physical work load and energy expenditure, Anthropometry – measures – design procedure, Work postures-sitting, standing - measurement – ergonomic implications. design of displays and controls,

UNIT V  ENVIRONMENTAL FACTORS

REFERENCES:
3. Introduction to work study, ILO, 3rd edition, Oxford & IBH publishing, 2001

TOTAL: 45 PERIODS
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<td>Plant location analysis – factors, costs, location decisions – single facility location models, multi facility location models- set covering problem – warehouse location problems.</td>
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<td>Facilities requirement, need for layout study – types of layout, Designing product layout-Line balancing.</td>
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<td>Design cycle – SLP procedure, computerized layout planning procedure – ALDEP, CORELAP, CRAFT</td>
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<td>Group technology – Production Flow analysis (PFA), ROC (Rank Order Clustering) – Line balancing.</td>
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<td>Principles, unit load concept, material handling system design, handling equipment types, selection and specification, containers and packaging.</td>
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**TOTAL: 45 PERIODS**

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<td>Need for forecasting, the forecasting process, Forecasting methods- qualitative methods, Quantitative models-Time series forecasting models, moving averages, exponential smoothing with trend and seasonal adjustment, multi-item forecasting, Simple and multiple linear regression models, monitoring and controlling forecasts.</td>
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<td>Types of inventory, Inventory classification methods, Inventory costs Inventory models-deterministic models, probabilistic models - safety stock and reorder points – Inventory control systems.</td>
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<td>Capacity planning- short term and long term capacity, capacity of facilities, break even capacity, use of decision trees, aggregate production planning - strategies, methods, Master Production Schedule, MRP- lot sizing, MRP II, CRP, ERP.</td>
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UNIT V  PRODUCTION CONTROL ACTIVITIES:  10
Production Activity Control, Just-in-time systems, Scheduling in Manufacturing, Theory of constraints and synchronous manufacturing.

T=15, TOTAL: 60 PERIODS

REFERENCES:

MA8160  PROBABILITY AND STATISTICAL METHODS  L T P C 
3 1 0 4

OBJECTIVES:
• To introduce the basic concepts of one dimensional and two dimensional Random Variables.
• To provide information about Estimation theory, Correlation, Regression and Testing of hypothesis.
• To enable the students to use the concepts of multivariate normal distribution and principle components analysis.

OUTCOMES:
• The course aims at providing the basic concepts of Probability and Statistical techniques for solving mathematical problems which will be useful in solving Engineering problems.

UNIT I  ONE DIMENSIONAL RANDOM VARIABLES  9+3
Random variables - Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Functions of a Random Variable.

UNIT II  TWO DIMENSIONAL RANDOM VARIABLES  9+3
Joint distributions – Marginal and Conditional distributions – Functions of two dimensional random variables – Regression Curve – Correlation.

UNIT III  ESTIMATION THEORY  9+3

UNIT IV  TESTING OF HYPOTHESES  9+3
Sampling distributions - Type I and Type II errors - Tests based on Normal, t, Chi-Square and F distributions for testing of mean, variance and proportions – Tests for Independence of attributes and Goodness of fit.

UNIT V  MULTIVARIATE ANALYSIS:  9+3

TOTAL: 60 PERIODS

BOOKS FOR STUDY:
REFERENCES:

IL8111 WORK DESIGN AND ERGONOMICS LAB  L T P C
0 0 2 1

AIM:
- To understand the theory better and apply in practice, practical training is given in the following areas:

LIST OF EXPERIMENTS
1. Graphic tools for method study
2. Performance rating exercise
3. Stop watch time study
4. Peg board experiment
5. Work sampling
6. MTM practice
7. Study of physical performance using tread mill and Ergo cycle
8. Physical fitness testing of individuals
9. Experiments using sound level and lux meters
10. Experiments using Ergonomics software

TOTAL: 30 PERIODS

LABORATORY EQUIPMENTS REQUIREMENTS
1. Time study Trainer
2. Peg board
3. Stop watches
4. Tread mill
5. Ergo cycle
6. Any one Ergonomics software (Eg.: Ergomaster, Human CAD)

IL8201 MANUFACTURING SYSTEMS AND MODELS  L T P C
3 0 0 3

UNIT I INTRODUCTION
Manufacturing systems – types and concepts, manufacturing automation - Performance measures – types and uses of manufacturing models.

UNIT II FOCUSED FACTORIES
GT/CMS, FMS planning, design and control. Process planning – variant and generative approaches of CAPP, general serial systems – analysis of paced and unplaced lines.

UNIT III LEAN SYSTEMS
Characteristics of Lean systems for services and Manufacturing, Pull method of work flow, Small lot sizes, Kanban system, Value stream mapping, JIT

UNIT IV QUEUING MODELS OF MANUFACTURING
Basic Queuing models, Queuing networks, application of queuing models for AMS.
UNIT V
MARKOV AND PETRINET MODELS OF MANUFACTURING


TOTAL: 45 PERIODS

REFERENCES:

IL8202 QUALITY ENGINEERING

UNIT I INTRODUCTION

Statistical concepts for quality- Fundamentals of quality- history, Quality definitions, Quality dimensions, Quality terminology- Inspection, Quality control, SQC, Quality Assurance, Quality planning- policies & objectives, Quality costs – Economics of quality, Quality loss function, Quality Vs productivity, Quality Vs reliability.

UNIT II STATISTICAL PROCESS CONTROL

Process variation, Control charts for variables- X̄, R and S charts- preliminary decisions, computation of control limits, Construction and interpretation, Relation between process in control and specification limits, modified and warning control limits, O.C. curve for X̄ chart, Control procedure, adjustment for trend in process mean.

UNIT III SPECIAL CONTROL PROCEDURES

Control charts for attributes- p, np, c and u charts, demerits control chart, O.C curve for p-chart, Control charts for individual measurements- X-chart, moving average and moving range charts, cumulative-sum and exponentially weighted moving average control charts, multi-vari chart.

UNIT IV PROCESS AND MEASUREMENT SYSTEM CAPABILITY

Process stability, process capability analysis using a Histogram or normal probability plot and control chart, process capability indexes, Gauge capability studies, setting specification limits.

UNIT V ACCEPTANCE SAMPLING


TOTAL: 45 PERIODS

REFERENCES:
# Systems and Simulation

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**TOTAL: 45 PERIODS**

**References:**

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# Logistics and Supply Chain Management

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**Objective:**
- To impart the fundamentals of logistics and supply chain management and to apply them to various manufacturing problems.

**Outcome:**
The students should apply information, demand forecasting, inventory management, transportation, warehousing & distribution, protective packaging, order processing, materials handling, purchasing & sourcing management techniques to manufacturing systems.

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**References:**
UNIT III  TRANSPORTATION, WAREHOUSING & DISTRIBUTION  11

UNIT IV  PROTECTIVE PACKAGING, ORDER PROCESSING, MATERIALS HANDLING, PURCHASING & SOURCING MANAGEMENT  9

UNIT V  L&SCM ADMINISTRATION  7

REFERENCES:

IL8211  COMPUTER APPLICATIONS LAB  L T P C
0 0 3 2
To understand the theory better and apply in practice, practical training is given in the following areas.

UNIT I  Development of Simple Programs for Statistical analysis: Frequency distribution, Applications of Graphics. (Charts, Graphs etc).  9

UNIT II  Programs for OR applications like Initial solution of Transportation Problems, Net Works etc  9

UNIT III  Solving optimization problems using software packages like LINDO, LINGO, TORA,Excel Solver.  9

UNIT IV  Development of Random number generator, Testing of random number generator. Non-uniform Random varieties generation and testing. Single server Queuing simulation, Case Studies  9

UNIT V  Program for Simulation of Single server Queuing System – Use of Simulation software. Case studies.  9

LABORATORY EQUIPMENTS REQUIREMENTS
1. TURBO C++ Software
2. LINDO Software
3. LINGO Software
4. TORA Software
5. GPSS Software
6. MS EXCEL

TOTAL: 45 PERIODS
IL8212 TECHNICAL SEMINAR

OBJECTIVE:
- To enrich the communication skills of the student through presentation of topics in recent advances in engineering/technology

OUTCOME:
- Students will develop skills to read, write, comprehend and present research papers.
- Students shall give presentations on recent areas of research in manufacturing engineering in two cycles. Depth of understanding, coverage, quality of presentation material (PPT/OHP) and communication skill of the student will be taken as measures for evaluation.

TOTAL: 30 PERIODS

IL8301 DESIGN OF EXPERIMENTS AND TAGUCHI METHODS

UNIT I EXPERIMENTAL DESIGN FUNDAMENTALS
Importance of experiments, experimental strategies, basic principles of design, terminology, ANOVA, steps in experimentation, sample size, normal probability plot, linear regression models.

UNIT II SINGLE FACTOR EXPERIMENTS
Completely randomized design, Randomized block design, Latin square design. Statistical analysis, estimation of model parameters, model adequacy checking, pair wise comparison tests.

UNIT III MULTIFACTOR EXPERIMENTS
Two and three factor full factorial experiments, Randomized block factorial design, Experiments with random factors, rules for expected mean squares, approximate F- tests. $2^K$ factorial Experiments.

UNIT IV SPECIAL EXPERIMENTAL DESIGNS:
Blocking and confounding in $2^k$ designs. Two level Fractional factorial design, nested designs, Split plot design, Response Surface Methods.

UNIT V TAGUCHI METHODS
Steps in experimentation, design using Orthogonal Arrays, data analysis, Robust design- control and noise factors, S/N ratios, parameter design, Multi-level experiments, Multi-response optimization.

T=15, TOTAL: 60 PERIODS

REFERENCES:
IL8001 ADVANCED OPTIMIZATION TECHNIQUES L T P C
UNIT I INTRODUCTION 5
Classification of optimization problems, concepts of design vector, Design constraints, constrains
surface, objective function surface and multi-level optimization, parametric linear programming

UNIT II DECISION ANALYSIS 10
Decision Trees, Utility theory, Game theory, Multi Objective Optimization, MCDM- Goal
Programming, Analytic Hierarchy process, ANP

UNIT III NON-LINEAR OPTIMIZATION 15
Unconstrained one variable and multi variable optimization, KKT Conditions, Constrained
optimization, Quadratic programming, Convex programming, Separable programming, Geometric
programming, Non-Convex programming

UNIT IV NON-TRADITIONAL OPTIMIZATION -1 15
Classes P and NP, Polynomial time reductions, Introduction to NP- Hard problems, Overview of
Genetic algorithms, Simulated Annealing, neural network based optimization.

UNIT V NON-TRADITIONAL OPTIMIZATION -2 5
Particle Swarm optimization, Ant Colony Optimization, Optimization of Fuzzy Systems.

TOTAL: 45 PERIODS

REFERENCES:
India, 2006.
1995.

IL8002 DESIGN OF ALGORITHMS L T P C
UNIT I INTRODUCTION 5
Algorithms, basic steps in development.

UNIT II REVIEW OF ANY ONE OF THE STRUCTURED LANGUAGES 10

UNIT III BASIC TOOLS 5
Top down, Structured programming, networks, data structure.

UNIT IV METHODS OF DESIGN 10
Sub goals, hill climbing and working backward, heuristics, back track programming, Branch and
bound recursion process, program testing, documentation, Meta heuristics.

UNIT V APPLICATION 15
Development of sorting, searching, algorithms- combinatorial problems, shortest path, probabilistic
algorithms.

TOTAL: 45 PERIODS

REFERENCES:
2. Goodman S.F. & Headtruebu, S.T.,Introduction to the design and analysis of algorithms,

IL8003 ENGINEERING ECONOMICS AND COSTING

UNIT I DEMAND ANALYSIS AND FORECASTING

UNIT II PRODUCTION FUNCTION AND COST ANALYSIS

UNIT III MARKET COMPETITION AND PRICING

UNIT IV PROFIT ANALYSIS
The concept of profit: Profit planning, control and measurement of profits. Profit maximisation – Cost volume profit analysis – Investment Analysis.

UNIT V COSTING
Job costing-Process costing-Operating costing-Standard Costing (variance analysis) and budgeting-

TOTAL: 45 PERIODS

REFERENCES:
4. Jawaharlal, Cost Accounting, Tata McGraw Hill,

IL8004 HUMAN FACTORS ENGINEERING

UNIT I PHYSIOLOGICAL PERFORMANCE
Factors affecting physiological performance, physical work load and energy expenditure, heat stress, manual lifting, shift work

UNIT II WORK SPACE DESIGN
Anthropometry, Workspace designs for standing and seated workers, arrangement of components within a physical space, interpersonal aspect of workplace design.
**UNIT III  DESIGN OF EQUIPMENT**  
Ergonomic factors to be considered in the design of displays and control, design for maintainability, design of human computer interaction.

**UNIT IV  COGNITIVE ERGONOMICS**  
Information Theory, Information processing, signal detection theory, Human response, human errors, cognitive task analysis.

**UNIT V  DESIGN OF ENVIRONMENT**  
Vision and Illumination design – Noice and Vibration

**TOTAL: 45 PERIODS**

**REFERENCES:**

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**IL8005  INDUSTRIAL AUTOMATION**  

<table>
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<tr>
<th>UNIT</th>
<th>AUTOMATION</th>
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<td></td>
<td>Types of production – Functions – Automation strategies – Production economics – Costs in manufacturing – Break-even analysis.</td>
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</table>

**UNIT II  AUTOMATED FLOW LINES**  
Transfer mechanism - Buffer storage – Analysis of transfer lines - Automated assembly systems.

**UNIT III  NUMERICAL CONTROL ANDRobotics**  

**UNIT IV  AUTOMATED HANDLING AND STORAGE**  
Automated material handling systems – AGV- AS/RS – carousel storage – Automatic data capture – bar code technology- RFID

**UNIT V  MANUFACTURING SUPPORT SYSTEMS**  
Product design and CAD, CAD/CAM and CIM, Computer aided process planning- variant and generative approaches, Concurrent engineering and design for manufacture, Lean production, Agile manufacturing.

**TOTAL: 45 PERIODS**

**REFERENCES:**

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**IL8006  KNOWLEDGE ENGINEERING AND MANAGEMENT**  

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<th>UNIT</th>
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<td>The value of Knowledge – Knowledge Engineering Basics – Knowledge Economy – The Task and Organizational Content – Knowledge Management – Knowledge Management Ontology.</td>
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15
UNIT II KNOWLEDGE MODELS 9

UNIT III TECHNIQUES OF KNOWLEDGE MANAGEMENT 9
Knowledge Elicitation Techniques – Modeling Communication Aspects – Knowledge Management and Organizational Learning.

UNIT IV KNOWLEDGE SYSTEM IMPLEMENTATION 9

UNIT V ADVANCED KM 9

TOTAL: 45 PERIODS

REFERENCES:

IL8007 MAINTAINABILITY ENGINEERING L T P C 3 0 0 3

UNIT I MAINTENANCE CONCEPT 6

UNIT II MAINTENANCE MODELS 12

UNIT III MAINTENANCE LOGISTICS 11

UNIT IV MAINTENANCE QUALITY 8

UNIT V TOTAL PRODUCTIVE MAINTENANCE 8
TPM features – Chronic and sporadic losses – Equipment defects – Six major losses – Overall Equipment Effectiveness – TPM pillars – Autonomous maintenance – TPM implementation

TOTAL: 45 PERIODS

REFERENCES:
UNIT I  SCHEDULING THEORY

UNIT II  SINGLE MACHINE SCHEDULING
Pure sequencing model – Hodgson’s algorithm – Smith’s rule – Wilkerson Irwin algorithm – Neighborhood search – Dynamic programming technique – Branch and Bound algorithm – Non simultaneous arrivals – Minimizing \( \bar{T} \) and \( \bar{F} \) for dependent jobs – Sequence dependent set up times.

UNIT III  PARALLEL MACHINE SCHEDULING

UNIT IV  FLOW SHOP SCHEDULING

UNIT V  JOB SHOP SCHEDULING

REFERENCES:
UNIT IV INTERPRETATION OF ALTERNATIVES AND DECISION MAKING

Types of decisions – descriptive, prescriptive, normative; Decision assessment efforts types – under certainty, probabilistic uncertainty, probabilistic imprecision, information imperfection, conflict and cooperation; Prescriptive normative decision assessments; Utility theory; Group decision making, Game Theory.

UNIT V SYSTEMS ENGINEERING MANAGEMENT CONCEPTS

Organizational structures, SE management plan; Network based systems planning and management methods; Cognitive factors in SE.

REFERENCES:
UNIT III  BUSINESS EXCELLENCE AWARDS IN INDIA  7
Models in Business excellence: RBNQA CII EXIM Award, Tata BE Model etc

UNIT IV  IMPLEMENTING BUSINESS EXCELLENCE MODEL  10
Basic concepts – Training -Report writing – Internal audit-Report submission – Initial assessment - Site visit – Scoring – Criteria for Award, Award finalization

UNIT V  CASE STUDY  8
TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
http://www.baldrige.nist.gov
http://www.baldrige21.com/
www.imc.org
www.qimpro.com
www.imcrbnqa.com
www.efqm.org
www.juse.or.jp/e/deming/index.html

IL8073  DATA ANALYSIS TECHNIQUES  L T P C
UNIT I  STATISTICAL DATA ANALYSIS  9

UNIT II  DATA ANALYSIS I  9
Introduction – Basic concepts – Uni-variate, Bi-variate and Multi-variate techniques – Types of multivariate techniques – Classification of multivariate techniques – Guidelines for multivariate analysis and interpretation – Approaches to multivariate model building.

UNIT III  DATA ANALYSIS II  9
Simple and Multiple Linear Regression Analysis – Introduction – Basic concepts – Multiple linear regression model – Least square estimation – Inferences from the estimated regression function – Validation of the model.
Canonical Correlation Analysis - Objectives – Canonical variates and canonical correlation – Interpretation of variates and correlations.

UNIT IV  DATA ANALYSIS III  9
Multiple Discriminant Analysis - Basic concepts – Separation and classification of two populations - Evaluating classification functions – Validation of the model.

UNIT V  DATA ANALYSIS IV  9

Multi Dimensional Scaling – Definitions – Objectives – Basic concepts – Scaling techniques – Attribute and Non-Attributes based MDS Techniques – Interpretation and Validation of models.
Advanced Techniques – Structural Equation modeling

TOTAL: 45 PERIODS

REFERENCES:

IL8074 DECISION SUPPORT SYSTEMS

UNIT I DECISION MAKING
Managerial decision making, system modeling and support-preview of the modeling process-phases of decision making process.

UNIT II MODELING AND ANALYSIS
DSS components- Data warehousing, access, analysis, mining and visualization-modeling and analysis-DSS development.

UNIT III KNOWLEDGE MANAGEMENT
Group support systems - enterprise DSS - supply chain and DSS - knowledge management methods, technologies and tools.

UNIT IV INTELLIGENT SYSTEMS
Artificial intelligence and expert systems-concepts, structure, types - knowledge acquisition and validation, knowledge representation

UNIT V IMPLEMENTATION
Implementation, integration and impact of management support systems.

REFERENCES:

IL8075 INDUSTRIAL SAFETY AND HYGIENE

UNIT I OPERATIONAL SAFETY
UNIT II  SAFETY APPRAISAL AND ANALYSIS

UNIT III  OCCUPATIONAL HEALTH
Concept and spectrum of health functional units and activities of operational health service – occupational and related disease – levels of prevention of diseases – notifiable occupational diseases Toxicology Lead – Nickel, chromium and manganese toxicity – gas poisoning (such as CO, Ammonia Chlorise, So2, H2s.) their effects and prevention – effects of ultra violet radiation and infrared radiation on human system.

UNIT IV  SAFETY AND HEALTH REGULATIONS

UNIT V  SAFETY MANAGEMENT

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
1. Occupational Safety Manual BHEL.
2. Industrial Safety and the law by P.M.C Nair Publishers, Trivandrum.
### UNIT II  LEAN SIX SIGMA APPROACH
Evolution of lean six sigma, the synergy of Lean and six sigma, Definition of lean six sigma, the principles of lean six sigma, Scope for lean six sigma, Features of lean six sigma, The laws of lean six sigma, Benefits of lean six sigma, Introduction to DMAIC tools.

### UNIT III  INITIATION FOR LEAN SIX SIGMA

### UNIT IV  PROJECT SELECTION FOR LEAN SIX SIGMA
Resource and project selection, Selection of Black belts, Selecting projects – Benefit/Effort graph, Process mapping, value stream mapping, Balanced score card for project identification, project suitable for lean six sigma.

### UNIT V  THE DMAIC PROCESS AND INSTITUTIONALIZING THE LSS
Predicting and improving team performance, Nine team roles, Team leadership, DMAIC process, Institutionalizing lean six sigma, Design for lean six sigma, Case study presentations.

**TOTAL: 45 PERIODS**

**REFERENCES:**
5. Rother M. and hook J., Learning to See: Value Stream Mapping to add value and Eliminate Muda, Lean Enterprise Institute, Brookline, MA.

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**IL8077  LOGISTICS AND DISTRIBUTION MANAGEMENT**

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<td>I</td>
<td>CONCEPTS OF LOGISTICS AND DISTRIBUTION</td>
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<td>PLANNING FOR LOGISTICS</td>
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<td>III</td>
<td>WAREHOUSING AND STORAGE</td>
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<td>FREIGHT TRANSPORT</td>
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<td>V</td>
<td>OPERATIONAL MANAGEMENT</td>
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**TOTAL: 45 HOURS**
REFERENCES:

IL8078 MANAGEMENT ACCOUNTING AND FINANCIAL MANAGEMENT  L T P C  
UNIT I FINANCIAL ACCOUNTING  10

UNIT II COST ACCOUNTING  10

UNIT III BUDGETING  10
Requirements for a sound budget, Fixed budget – Preparation of sales and Production budget, Flexible budgets, Zero base budgeting and budgetary control.

UNIT IV FINANCIAL MANAGEMENT  10
Investment decisions – Capital investment process, Type of investment proposals, Investment appraisal techniques – Payback period method, Accounting rate of return, Net present value method, Internal rate of return and Profitability index method.

UNIT V FINANCIAL DECISIONS  5
Cost of capital – Capital structure – Dividend policy – Leasing.

REFERENCES:

IL8079 MULTIVARIATE DATA ANALYSIS  L T P C  
UNIT I REGRESSION  9
Simple Regression and Correlation – Estimation using the regression line, Correlation analysis, Multiple regression and Correlation analysis – Finding the Multiple Regression equation, Modelling techniques, Making inferences about the population parameters.

UNIT II MULTIVARIATE METHODS  9
An overview of Multivariate methods, Multivariate Normal distribution, Eigen values and Eigen vectors.
### UNIT III FACTOR ANALYSIS

### UNIT IV DISCRIMINANT ANALYSIS
Discriminant analysis – Discrimination for two multivariate normal Populations – Discriminant functions.

### UNIT V CLUSTER ANALYSIS
Cluster analysis – Clustering methods, Multivariate analysis of Variance.

**REFERENCES:**

**IL8080 PRODUCTIVITY MANAGEMENT AND RE-ENGINEERING**

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#### UNIT I PRODUCTIVITY
Productivity Concepts – Macro and Micro factors of productivity – Dynamics of Productivity - Productivity Cycle Productivity Measurement at International, National and Organisation level - Productivity measurement models

#### UNIT II SYSTEMS APPROACH TO PRODUCTIVITY MEASUREMENT
Conceptual frame work, Management by Objectives (MBO), Performance Objectivated Productivity (POP) – Methodology and application to manufacturing and service sector.

#### UNIT III ORGANISATIONAL TRANSFORMATION
Elements of Organisational Transformation and Reengineering-Principles of organizational transformation and re-engineering, fundamentals of process re-engineering, preparing the workforce for transformation and re-engineering, methodology, guidelines, LMI CIP Model – DSMC Q & PMP model.

#### UNIT IV RE-ENGINEERING PROCESS IMPROVEMENT MODELS
PMI models, PASIM Model, Moen and Nolan Strategy for process improvement, LMICIP Model, NPRDC Model.

#### UNIT V RE-ENGINEERING TOOLS AND IMPLEMENTATION
Analytical and process tools and techniques – Information and Communication Technology – Implementation of Reengineering Projects – Success Factors and common implementation Problem – Cases.

**TOTAL: 45 PERIODS**

**REFERENCES:**
IL8081  PROJECT MANAGEMENT  L T P C  3 0 0 3

UNIT I  STRATEGIC MANAGEMENT AND PROJECT SELECTION  9
Project selection models, Project portfolio process, Analysis under uncertainty, Project organization, Matrix organization

UNIT II  PROJECT PLANNING  9
Work breakdown structure, Systems integration, Interface coordination, Project life cycle, Conflict and negotiation,

UNIT III  PROJECT IMPLEMENTATION  12
Estimating Project Budgets, Process of cost estimation, Scheduling: Network Techniques PERT and CPM, Risk analysis using simulation, CPM- crashing a project, Resource loading, leveling, and allocation

UNIT IV  MONITORING AND INFORMATION SYSTEMS  9
Information needs and the reporting process, computerized PMIS, Earned value analysis, Planning-Monitoring-Controlling cycle, Project control: types of control processes, design of control systems, control of change and scope

UNIT V  PROJECT AUDITING  6
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 – A project history

TEXT BOOKS
1. R.Panneer selvam, P. Senthil Kumar, Project Management, PHI, 2010

REFERENCES:

IL8082  RELIABILITY ENGINEERING  L T P C  3 0 0 3

UNIT I  RELIABILITY CONCEPTS  9

UNIT II  LIFE DATA ANALYSIS  11

UNIT III  RELIABILITY ASSESSMENT  10
Different configurations – Redundancy – k out of n system – Complex systems: RBD – Baye’s approach – Cut and tie sets – Fault Trees – Standby systems.

UNIT IV  RELIABILITY MONITORING  8
UNIT V  RELIABILITY IMPROVEMENT  7

TOTAL: 45 PERIODS

REFERENCES:

IL8083  SERVICES OPERATIONS MANAGEMENT  L T P C
3 0 0 3

UNIT I  INTRODUCTION TO SERVICES  6
Manufacturing and Services, Definition of Service, Characteristic of Service, Nature of Services, Importance of Activity, Impact of technology

UNIT II  GLOBALIZATION AND STRATEGY  7
Types of Globalized Services, Outsourcing, issues in Globalization, Service strategies

UNIT III  OPERATIONS ISSUES  12
Forecasting, Inventory, capacity Planning, Scheduling

UNIT IV  SERVICE QUALITY AND PRODUCTIVITY  10
Importance of Quality, Models for Service Quality, GAPS model, issues in productivity measurement, Work measurement

UNIT V  TOOLS FOR SERVICES  10
Data Envelopment Analysis, Queuing models, Vehicle Routing models

TOTAL: 45 PERIODS

REFERENCES:

IL8084  SYSTEMS ANALYSIS AND DESIGN  L T P C
3 0 0 3

UNIT I  SYSTEMS ANALYSIS FUNDAMENTALS  9
Information systems analysis overview, Classification of information systems, Systems development life cycle, Role of systems analyst, and Role of case tools

UNIT II  INFORMATION REQUIREMENT ANALYSIS  9
Sampling and investigating hard data, Interviewing, Using Questionnaires, Developing prototype, System requirements specification, Feasibility analysis

UNIT III  ANALYSIS PROCESS  9
Data flow diagrams, Data dictionary, Process specifications, Presenting the systems proposal

UNIT IV  ESSENTIALS OF DESIGN  9
Designing effective output, designing the database, designing the user interface, Designing data entry procedures

26
UNIT V SOFTWARE ENGINEERING AND IMPLEMENTATION 9
Quality assurance through software engineering, Implementation approaches, Implementing distributed systems, Object oriented systems analysis and design

TOTAL: 45 PERIODS

REFERENCES:

IL8085 TECHNOLOGY MANAGEMENT L T P C
UNIT I INTRODUCTION 3 0 0 3
Technology management - Scope, components, and overview. Technology and environment, Technology and society, Technology Impact analysis, environmental, social, legal, political aspects, techniques for analysis - steps involved. Technology policy strategy: Science and technology Policy of India, implications to industry, The dynamics of technology change

UNIT II TECHNOLOGY FORECASTING 9

UNIT III TECHNOLOGY CHOICE AND EVALUATION 9
Issues in the development high tech products, Methods of analyzing alternate technologies, Techno-economic feasibility studies, Need for multi-criteria considerations such as, social, environmental, and political, Analytic hierarchy method, Fuzzy multi-criteria decision making, and other methods.

UNIT IV TECHNOLOGY TRANSFER AND ACQUISITION 9
Import regulations, Implications of agreements like Uruguay Round and WTO, Bargaining process, Transfer option, MOU- Technology Adoption and Productivity - Adopting technology-human interactions, Organisational redesign and re-engineering, Technology productivity.

UNIT V TECHNOLOGY ABSORPTION AND INNOVATION 9
Present status in India, Need for new outlook, Absorption strategies for acquired technology, creating new/improved technologies, Innovations, Technology Measurement- Technology Audit, Risk and exposure, R&D portfolio management

TOTAL: 45 PERIODS

REFERENCES:
5. Irvin M. Rubin, Organisational behavior an experimental approach, Prentice Hall, 1995

MS8071 CELLULAR MANUFACTURING SYSTEMS L T P C
OBJECTIVE:
- To impart knowledge on planning, design, implementation, and control of group technology and cellular manufacturing.

27
OUTCOME:
- The students should apply the various tools, techniques and methodology used in planning, design, implementation, and control of group technology and cellular manufacturing.

UNIT I INTRODUCTION

UNIT II CMS PLANNING & DESIGN

UNIT III IMPLEMENTATION OF GT/CMS
Inter and intra cell layout and capacity planning – Managerial structure and groups – Batch sequencing and sizing – Life cycle issues in GT/CMS – Linkages to JIT systems.

UNIT IV PERFORMANCE MEASUREMENT & CONTROL

UNIT V ECONOMIC OF GT/CMS

REFERENCES:

QE8072 PRODUCT INNOVATION AND DEVELOPMENT

UNIT I PRODUCT DEVELOPMENT AND CONCEPT SELECTION

UNIT II PRODUCT ARCHITECTURE
Product architecture – Implication of the architecture – Establishing the architecture – Related system level design issues.

UNIT III INDUSTRIAL AND MANUFACTURING DESIGN
Need for industrial design – Impact of industrial design – Industrial design process. Assessing the quality of industrial design - Human Engineering consideration – Estimate the manufacturing cost – Reduce the component cost – Reduce the assembly cost – Reduce the support cost – Impact of DFM decisions on other factors.

UNIT IV PROTOTYPING AND ECONOMIC ANALYSIS
UNIT V       MANAGING PRODUCT DEVELOPMENT PROJECTS
Sequential, parallel and coupled tasks - Baseline project planning – Project Budget - Project execution – Project evaluation- patents- patent search-patent laws-International code for patents.

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:

QE8151                                  TOTAL QUALITY MANAGEMENT  L T P C  3 0 0 3
UNIT I INTRODUCTION  9

UNIT II TQM PRINCIPLES  9
Leadership, Customer Satisfaction, Employee Involvement, Continuous Process Improvement, Supplier Partnership, Performance Measures, Cost of Quality.

UNIT III TOOLS AND TECHNIQUES – 1  9
Benchmarking, Information Technology, Quality Management Systems and environmental management systems.

UNIT IV TOOLS AND TECHNIQUES – 2  9
QFD, FMEA, Quality Circles, TPM, Traditional Quality Tools and Management tools.

UNIT V IMPLEMENTATION OF TQM  9
Steps in TQM implementation, national and international quality awards, case studies.

TOTAL: 45 PERIODS

REFERENCES:

QE8251                                  SOFTWARE QUALITY ENGINEERING  L T P C  3 0 0 3
UNIT I SOFTWARE QUALITY  5
Definition of Software Quality, Quality Planning, Quality system – Quality Control Vs Quality Assurance – Product life cycle – Project life cycle models.
UNIT II SOFTWARE ENGINEERING ACTIVITIES 10

UNIT III SUPPORTING ACTIVITIES 10
Metrics, Reviews – SCM – Software quality assurance and risk management.

UNIT IV SOFTWARE QUALITY MANAGEMENT TOOLS 10
Seven basic Quality tools – Checklist – Pareto diagram – Cause and effect diagram – Run chart – Histogram – Control chart – Scatter diagram – Poka Yoke – Statistical process control – Failure Mode and Effect Analysis – Quality Function deployment – Continuous improvement tools – Case study.

UNIT V QUALITY ASSURANCE MODELS 10

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES: