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ANNA UNIVERSITY :: CHENNAI 600 025
REGULATIONS - 2013
M.E. INDUSTRIAL ENGINEERING (PART TIME)
I TO VI SEMESTERS CURRICULUM AND SYLLABUS

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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  L T P C  3 1 0 4

UNIT I  INTRODUCTION-LP  9
Concepts of OR, development, applications, LP Definitions, assumptions, formulation, graphical method, Simplex algorithm.

UNIT II  LP-EXTENSIONS  9
Duality- primal dual relationships -Dual Simplex — sensitivity analysis, Data Envelopment Analysis.

UNIT III  NETWORKS  9
Transportation, Assignment, Maximal flow, Shortest route, Spanning tree problems, Project Networks.

UNIT IV  DYNAMIC PROGRAMMING  9
Dynamic Programming-Concepts, formulation, recursive approach; applications

UNIT V  WAITING LINES  9
Queueing characteristics and terminology, poisson and non-poisson models.

T=15, TOTAL: 60 PERIODS

REFERENCES:

IL8102  WORK DESIGN AND ERGONOMICS  L T P C  3 0 0 3

UNIT I  METHOD STUDY  9
Work design and Productivity – Productivity measurement - Total work content, Developing methods – operation analysis, motion & micro motion study, graphic tools.

UNIT II  WORK MEASUREMENT  9
Stop watch time study, Performance rating, allowances, standard data-maching times for basic operations, learning effect

UNIT III  APPLIED WORK MEASUREMENT  9
Methods time measurement (MTM), Work sampling, organization and methods (O & M), Wage incentive plans.

UNIT IV  PHYSICAL ERGONOMICS  9
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  9

TOTAL: 45 PERIODS

REFERENCES:
3. Introduction to work study, ILO, 3rd edition, Oxford & IBH publishing,2001
IL8151 FACILITIES DESIGN

UNIT I PLANT LOCATION
Plant location analysis – factors, costs, location decisions – single facility location models, multi facility location models- set covering problem – warehouse location problems.

UNIT II FACILITIES LAYOUT
Facilities requirement, need for layout study – types of layout, Designing product layout-Line balancing.

UNIT III LAYOUT DESIGN
Design cycle – SLP procedure, computerized layout planning procedure – ALDEP, CORELAP, CRAFT

UNIT IV GROUP TECHNOLOGY AND LINE BALANCING
Group technology – Production Flow analysis (PFA), ROC (Rank Order Clustering) – Line balancing.

UNIT V MATERIAL HANDLING
Principles, unit load concept, material handling system design, handling equipment types, selection and specification, containers and packaging.

TOTAL: 45 PERIODS

REFERENCES:

IL8153 PRODUCTION MANAGEMENT


UNIT II FORECASTING:
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.

UNIT III INVENTORY MANAGEMENT:
Types of inventory, Inventory classification methods, Inventory costs Inventory models-deterministic models, probabilistic models - safety stock and reorder points – Inventory control systems.

UNIT IV PLANNING ACTIVITIES:
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.
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

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

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

UNIT II FOCUSSED 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


REFERENCES:

TOTAL: 45 PERIODS
IL8203 SYSTEMS AND SIMULATION

UNIT I INTRODUCTION
Systems, modeling, general systems theory, concept of simulation, simulation as a decision making tool, types of simulation.

UNIT II RANDOM NUMBERS AND VARIATES
Pseudo random numbers, methods of generating random variates, testing of random numbers and variates.

UNIT III DESIGN OF SIMULATION EXPERIMENTS
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.

UNIT IV SIMULATION LANGUAGES
Comparison and selection of simulation languages, study of any one simulation language.

UNIT V CASE STUDIES / MINI PROJECT
Development of simulation models using the simulation language studied for systems like, queuing systems, production systems, inventory systems, maintenance and replacement systems, investment analysis and network.

TOTAL: 45 PERIODS

REFERENCES:

IL8152 LOGISTICS AND SUPPLY CHAIN MANAGEMENT

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

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

UNIT I INTRODUCTION TO L&SCM

UNIT II INFORMATION, DEMAND FORECASTING, INVENTORY MANAGEMENT
UNIT III TRANSPORTATION, WAREHOUSING & DISTRIBUTION

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

UNIT V L&SCM ADMINISTRATION

REFERENCES:
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:
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  10
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:

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:

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  10
Ergonomic factors to be considered in the design of displays and control, design for
maintainability, design of human computer interaction.

UNIT IV  COGNITIVE ERGONOMICS  5
Information Theory, Information processing, signal detection theory, Human response, human
errors, cognitive task analysis.

UNIT V  DESIGN OF ENVIRONMENT  10
Vision and Illumination design – Noise and Vibration

TOTAL: 45 PERIODS

REFERENCES:
Francis Group 2006.

IL8005  INDUSTRIAL AUTOMATION  L T P C
3 0 0 3

UNIT I  AUTOMATION  5
Types of production – Functions – Automation strategies – Production economics – Costs in
manufacturing – Break-even analysis.

UNIT II  AUTOMATED FLOW LINES  10
Transfer mechanism - Buffer storage – Analysis of transfer lines - Automated assembly systems.

UNIT III  NUMERICAL CONTROL AND ROBOTICS  10
effectors – Sensors - Robot cell design – CAD/CAM.

UNIT IV  AUTOMATED HANDLING AND STORAGE  10
Automated material handling systems – AGV- AS/RS – carousel storage – Automatic data capture
– bar code technology- RFID

UNIT V  MANUFACTURING SUPPORT SYSTEMS  10
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:

IL8006  KNOWLEDGE ENGINEERING AND MANAGEMENT  L T P C
3 0 0 3

UNIT I  INTRODUCTION  9
The value of Knowledge – Knowledge Engineering Basics – Knowledge Economy – The Task and
Organizational Content – Knowledge Management – Knowledge Management Ontology.
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.

TOTAL: 45 PERIODS

REFERENCES:
1. Andrew P Sage and James E Armstrong, Introduction to Systems Engineering, Wiley Series,
   2000.
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

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

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  9
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  9

UNIT IV   PROJECT SELECTION FOR LEAN SIX SIGMA  9
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  9
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.

IL8077   LOGISTICS AND DISTRIBUTION MANAGEMENT  L T P C
3 0 0 3

UNIT I   CONCEPTS OF LOGISTICS AND DISTRIBUTION  9
Introduction to logistics and distribution- Integrated logistics and the supply chain- Integrated logistics and the supply chain- Customer service and logistics- Channels of distribution - Key issues and challenges for logistics.

UNIT II   PLANNING FOR LOGISTICS  9
Planning framework for logistics -Logistics processes -Supply chain segmentation- Logistics network planning - Logistics management and organization - Manufacturing and materials management

UNIT III   WAREHOUSING AND STORAGE  9
Principles of warehousing Storage and handling systems (palletized and non-palletized) - Order picking and replenishment- Receiving and dispatch - Warehouse design- Warehouse management and information

UNIT IV   FREIGHT TRANSPORT  9
International logistics: modal choice - Maritime transport - Air transport - Rail and intermodal transport- Road freight transport: vehicle selection, vehicle costing and planning and resourcing- International transportation systems in Global perspective.

UNIT V   OPERATIONAL MANAGEMENT  9
Cost and performance monitoring- Benchmarking- Information and communication technology in supply chain- Outsourcing: services and decision criteria, the selection process - Outsourcing management- Security and safety in distribution - Logistics and the environment.

TOTAL: 45 HOURS
REFERENCES:

IL8078 MANAGEMENT ACCOUNTING AND FINANCIAL MANAGEMENT L T P C
UNIT I FINANCIAL ACCOUNTING 3 0 0 3

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.

TOTAL : 45 PERIODS

REFERENCES:

IL8079 MULTIVARIATE DATA ANALYSIS L T P C
UNIT I REGRESSION 3 0 0 3
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:

TOTAL: 45 PERIODS

IL8080    PRODUCTIVITY MANAGEMENT AND RE-ENGINEERING

UNIT I    PRODUCTIVITY

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.

REFERENCES:

TOTAL: 45 PERIODS
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<td>Project selection models, Project portfolio process, Analysis under uncertainty, Project organization, Matrix organization</td>
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<td>Work breakdown structure, Systems integration, Interface coordination, Project life cycle, Conflict and negotiation,</td>
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<td>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</td>
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<td>MONITORING AND INFORMATION SYSTEMS</td>
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<td>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</td>
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<td>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</td>
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**TEXT BOOKS:****

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

**REFERENCES:****


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<td>RELIABILITY ASSESSMENT</td>
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<td>Different configurations – Redundancy – k out of n system – Complex systems: RBD – Baye’s approach – Cut and tie sets – Fault Trees – Standby systems.</td>
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UNIT V RELIABILITY IMPROVEMENT


TOTAL: 45 PERIODS

REFERENCES:

IL8083 SERVICES OPERATIONS MANAGEMENT

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

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

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

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

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

TOTAL: 45 PERIODS

REFERENCES:

IL8084 SYSTEMS ANALYSIS AND DESIGN

UNIT I SYSTEMS ANALYSIS FUNDAMENTALS
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
Sampling and investigating hard data, Interviewing, Using Questionnaires, Developing prototype, System requirements specification, Feasibility analysis

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

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

TOTAL: 45 PERIODS
UNIT V SOFTWARE ENGINEERING AND IMPLEMENTATION
Quality assurance through software engineering, Implementation approaches, Implementing distributed systems, Object oriented systems analysis and design

TOTAL: 45 PERIODS

REFERENCES:

IL8085 TECHNOLOGY MANAGEMENT

UNIT I INTRODUCTION
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

UNIT III TECHNOLOGY CHOICE AND EVALUATION
Issues in the development new 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
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
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

OBJECTIVE:
• To impart knowledge on planning, design, implementation, and control of group technology and cellular manufacturing.
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

TOTAL: 45 PERIODS

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
Principles of prototyping – Planning for prototypes - Elements of economic analysis – Base case financial model – Sensitivity analysis – Influence of the quantitative factors
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.

TEXT BOOK:

REFERENCES:

QE8151 TOTAL QUALITY MANAGEMENT
UNIT I INTRODUCTION
UNIT II TQM PRINCIPLES
Leadership, Customer Satisfaction, Employee Involvement, Continuous Process Improvement, Supplier Partnership, Performance Measures, Cost of Quality.
UNIT III TOOLS AND TECHNIQUES – 1
Benchmarking, Information Technology, Quality Management Systems and environmental management systems.
UNIT IV TOOLS AND TECHNIQUES - 2
QFD, FMEA, Quality Circles, TPM, Traditional Quality Tools and Management tools.
UNIT V IMPLEMENTATION OF TQM
Steps in TQM implementation, national and international quality awards, case studies.

REFERENCES:

QE8251 SOFTWARE QUALITY ENGINEERING
UNIT I SOFTWARE QUALITY
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

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

UNIT IV SOFTWARE QUALITY MANAGEMENT TOOLS
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

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES: