ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
REGULATIONS – 2015
CHOICE BASED CREDIT SYSTEM
M.E. QUALITY ENGINEERING AND MANAGEMENT (FT & PT)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To prepare students to excel in research or to succeed in Quality engineering and Management profession through global, rigorous post graduate education.

II. To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve quality engineering problems

III. To train students with good scientific and engineering knowledge so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.

IV. To inculcate students in professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate quality engineering issues to broader social context.

V. To provide student with an academic environment aware of excellence, leadership, written ethical codes and guidelines, and the life-long learning needed for a successful professional career

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

1. Graduates will demonstrate knowledge of mathematics, science and engineering.

2. Graduates will demonstrate an ability to identify, formulate and solve engineering problems.

3. Graduate will demonstrate an ability to design and conduct experiments, analyze and interpret data.

4. Graduates will demonstrate an ability to design a system, component or process as per needs and specifications.

5. Graduates will demonstrate an ability to visualize and work on multidisciplinary tasks.

6. Graduate will demonstrate skills to use modern engineering tools, software and equipment to analyze problems.

7. Graduates will demonstrate knowledge of professional and ethical responsibilities.

8. Graduate will be able to communicate effectively in both verbal and written form.

9. Graduate will show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues.

10. Graduate will develop confidence for self education and ability for life-long learning.
# Mapping of PEOs with POs

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[LOGO]
| YEAR 1 | SEM 1 | Probability and Statistics | ✓ | ✓ | ✓ |
|        |       | Manufacturing Systems and Processes | ✓ | ✓ | ✓ |
|        |       | Total Quality Management | ✓ | |
|        |       | Operations Research | ✓ | |
|        |       | Dimensional Metrology and Inspection | ✓ | |
|        |       | Elective I | |
|        |       | Statistical Applications and Optimization Lab | |
| YEAR 2 | SEM 2 | Statistical Quality Control | ✓ | ✓ | ✓ | ✓ |
|        |       | Quality by Design | ✓ | ✓ | ✓ | ✓ |
|        |       | Software Quality Engineering | ✓ | ✓ | ✓ | ✓ |
|        |       | Elective II | |
|        |       | Elective III | |
|        |       | Elective IV | |
|        |       | Quality System Design Project | ✓ | ✓ | ✓ | ✓ |
| YEAR 2 | SEM 3 | Elective V | |
|        |       | Elective VI | |
|        |       | Elective VII | |
|        |       | Project Work Phase I | ✓ | ✓ | ✓ | ✓ | ✓ |
| YEAR 2 | SEM 4 | Project Work Phase II | ✓ | ✓ | ✓ | ✓ | ✓ |
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### M.E. QUALITY ENGINEERING AND MANAGEMENT (PT)
### REGULATIONS – 2015
### CHOICE BASED CREDIT SYSTEM
### CURRICULA AND SYLLABI

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7
# SEMESTER VI

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TOTAL NO. OF CREDITS: 70

## FOUNDATION COURSES (FC)

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## PROFESSIONAL CORE (PC)

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## PROFESSIONAL ELECTIVES (PE)

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EMPLOYABILITY ENHANCEMENT COURSES (EEC)

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OBJECTIVE:
- To learn the basics of deterministic optimization tools.

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 Net Works.

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

UNIT V  WAITNG LINES AND GAME THEORY  9
Queueing characteristics and terminology, Poisson and non-Poisson models. Introduction to Game Theory

OUTCOME:
- The students can solve optimization problems of deterministic nature

REFERENCES:

MA7159  PROBABILITY AND STATISTICAL METHODS  L T P C
4 0 0 4

OBJECTIVE:
- 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.

UNIT I  ONE DIMENSIONAL RANDOM VARIABLES  12
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
Joint distributions – Marginal and Conditional distributions – Functions of two dimensional random variables – Regression Curve – Correlation.

UNIT III ESTIMATION THEORY:

UNIT IV TESTING OF HYPOTHESES:
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:

TOTAL: 60 PERIODS

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.

TEXTBOOKS:

REFERENCES:

QE7101 DIMENSIONAL METROLOGY AND INSPECTION

OBJECTIVE:
• To learn the basic concepts of Measurements and Metrology, and to get a clear Knowledge about the available Measurement systems and Instruments.

UNIT I LINEAR MEASUREMENT AND ANGULAR MEASUREMENT
UNIT II  STANDARDS FOR LINEAR AND ANGULAR MEASUREMENTS  8
Shop floor standards and their calibration, light interference, Method of coincidence, Slip gauge calibration, Measurement errors, Limits, fits, Tolerance, Gauges, Gauge design.

UNIT III  MEASUREMENT APPLICATION  8

UNIT IV  MODERN CONCEPTS  8
Image processing and its application in Metrology, Co-ordinate measuring machine, Types of CMM, Probes used, Application, Non-contact CMM using Electro-optical sensors for dimensional metrology.

UNIT V  MEASUREMENT SYSTEMS  9
System configuration, basic characteristics of measuring devices, Displacement, force and torque measurement, standards, Calibration, Sensors, Basic principles and concepts of temperature, Pressure and flow measurement, Destructive testing – Nondestructive testing.

TOTAL: 45 PERIODS

OUTCOME :
- This Programme provides the basic knowledge of measurements, measurement systems and measuring instruments applied in all the industries and also in business.

TEXT BOOK:

REFERENCES:

QE7102  MANUFACTURING PROCESSES AND SYSTEMS  3 0 0 3

OBJECTIVE :
- To impart the students in knowing the manufacturing systems and processes followed in all the manufacturing firms.

UNIT I  METAL CASTING AND FORMING PROCESS  8
Patterns – Preparation of moulds- Melting of metals- pouring of metals – defects of casting - forging – rolling - extrusion- drawing

UNIT II  METAL JOINING AND MACHINING PROCESS  10
UNIT III NON TRADITIONAL MACHINING TECHNIQUES 8
Electric discharge machining – wire EDM – chemical machining – elector chemical machining – ultrasound machining – abrasive jet machining – water jet machining

UNIT IV MANUFACTURING SYSTEMS 9
Manufacturing systems – Functions – Types of production – Costs in manufacturing - Modern manufacturing systems & controls

UNIT V WORK STUDY 10
Introduction to method study and time study.

OUTCOME:
- This course helps the students in getting knowledge of the manufacturing processes, manufacturing systems as well as work study, which forms a very important part of Production and Manufacturing.

REFERENCES:

QE7151 TOTAL QUALITY MANAGEMENT

OBJECTIVES:
- To get a clear understanding of Total Quality Management (TQM) principles, tools and techniques.
- Also the TQM implementation has to be explained by using case studies.

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
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.

OUTCOMES:
- After studying this subject, the students will get an idea about the practice and benefits of TQM in all the industries.

REFERENCES:

QE7111 STATISTICAL APPLICATIONS AND OPTIMIZATION LAB

OBJECTIVES:
To understand the theory better and apply in practice, practical training is given in the following areas.
1. Development of simple programs for statistical analysis: frequency distribution, Applications of Graphics.(Charts, Graphs etc.)
2. Descriptive Statistics
3. Simple and Multiple Regression
4. Use of statistical packages for factor analysis
5. Solving Linear Programming Problems
6. Solving Transportation and Assignment Models
7. Solving Network Flow Models
8. Solving Project Management Problems

LABORATORY SOFTWARE REQUIREMENTS
1. TURBO C++ Software
2. LINDO Software
3. LINGO Software
4. TORA Software.
5. Excel Software

TOTAL: 45 PERIODS

TOTAL: 60 PERIODS
QE7201 QUALITY BY DESIGN

OBJECTIVES:
- To make the students understand the application of Experimental design in quality control and improvement.

UNIT I INTRODUCTION
Perception of quality, Taguchi’s definition of quality – quality loss function, Planning of experiments, design principles, terminology, normal probability plot, Analysis of variance, Linear regression models.

UNIT II FACTORIAL EXPERIMENTS
Design and analysis of single factor and multi-factor experiments, tests on means, EMS rules.

UNIT III SPECIAL DESIGNS
2K Factorial designs, Fractional factorial designs, Nested designs, Blocking and Confounding.

UNIT IV ORTHOGONAL EXPERIMENTS
Selection of orthogonal arrays (OA’s), OA designs, conduct of OA experiments, data collection and analysis of simple experiments, Modification of orthogonal arrays.

UNIT V ROBUST DESIGN
Variability due to noise factors, Product and process design, Principles of robust design, objective functions in robust design - S/N ratios, Inner and outer OA experiments, optimization using S/N ratios, fraction defective analysis, case studies.

T=15, TOTAL: 60 PERIODS

OUTCOMES:
- The concepts of statistically designed experiments applied in industries to control and improve Quality can be well understood after studying this subject.

REFERENCES:

QE7252 SOFTWARE QUALITY ENGINEERING

OBJECTIVES:
- To gain Knowledge in the application of Quality Engineering in software industries.

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

OUTCOMES:
- The Practice of Quality control and Assurance in Software industries can be best understood after studying this subject.

TEXT BOOK:

REFERENCES:

QE7253 STATISTICAL QUALITY CONTROL
OBJECTIVES:
- To facilitate the students in knowing the application of statistical techniques in Quality control and assurance.

UNIT I INTRODUCTION
UNIT II  CONTROL CHARTS  12
Chance and assignable causes of process variation, statistical basis of the control chart, control _ charts for variables- X, R and S charts, attribute control charts - p, np, c and u-  Construction and application.

UNIT III  SPECIAL CONTROL PROCEDURES  8
Warning and modified control limits, control chart for individual measurements, multi-vari chart, X chart with a linear trend, chart for moving averages and ranges, cumulative-sum and exponentially weighted moving average control charts.

UNIT IV  STATISTICAL PROCESS CONTROL  8
Process stability, process capability analysis using a Histogram or probability plots and control chart. Gauge capability studies, setting specification limits.

UNIT V  ACCEPTANCE SAMPLING  10
The acceptance sampling fundamental, OC curve, sampling plans for attributes, simple, double, multiple and sequential, sampling plans for variables, MIL-STD-105D and MIL-STD-414E & IS2500 standards.

TOTAL: 45 PERIODS

OUTCOMES:
- Control the quality of processes using control charts for variables in manufacturing industries.
- Control the occurrence of defective product and the defects in manufacturing companies.
- Control the occurrence of defects in services.

REFERENCES:
4. IS 2500 Standard sampling plans

QE7311  PROJECT WORK PHASE I  L T P C
0 0 12 6

OBJECTIVES:
- To apply the principles or techniques the students have learnt to a new or existing problem situations leading to a solutions.

OUTCOMES:
- This will help the students in real time problem identification, critical examination, solution development and presentation of results in the form of report.
OBJECTIVES:
• To apply the principles or techniques the students have learnt to a new or existing problem situations leading to a solutions.

OUTCOMES:
• This will help the students in real time problem identification, critical examination, solution development and presentation of results in the form of report.

CI7076 SUPPLY CHAIN MANAGEMENT

OBJECTIVES :
• To help the students in knowing the concepts of Supply chain management, its importance, applications and the applications of various techniques in optimizing the supply chain network.

UNIT I INTRODUCTION TO SUPPLY CHAIN MANAGEMENT 8

UNIT II DESIGNING THE SUPPLY CHAIN NETWORK 9

UNIT III SOURCING, TRANSPORTATION AND PRICING 10

UNIT IV COORDINATION AND TECHNOLOGY 10
UNIT V  EMERGING CONCEPTS
3PL- 4PL-Global Logistics -Reverse Logistics; Reasons, Activities, Role. Ware house Management- RFID Systems; Components, applications, implementation. Lean supply Chains- Sustainable supply Chains

TOTAL: 45 PERIODS

OUTCOMES:
• After studying this subject, the students will get a clear understanding of the supply chain management concepts applied in business as well as production and manufacturing industries.

REFERENCES

IL7071  APPLIED OBJECT ORIENTED PROGRAMMING  L T P C
3 0 0 3

OBJECTIVES:
• To teach the basic concepts of object oriented programming

UNIT I  FUNDAMENTALS OF OBJECT ORIENTED PROGRAMMING  5
Elements of OOP, classes, subjects, messaging, inheritance, polymorphism, OOP paradigm versus procedural paradigm, object-oriented design.

UNIT II  C++ Basics  15
Expression and statements, operators, precedence, type conversion, control statements, loops, Arrays structures, functions, argument passing, reference argument, overloaded function.

UNIT III  C++ CLASS  5
Definition, class objects, member functions, , class argument, , operator overloading, user defined conversions.

UNIT IV  CLASS DERIVATION  10
Derivation specification, public and private base classes, standard conversions under derivation, class scope, initialization and assignment under derivation.

UNIT V  APPLICATION  10
OOP’s applications in Industrial Engineering.

TOTAL: 45 PERIODS

OUTCOMES:
• The students will acquire exposure in logical thinking and programming skills in solving real time problems.
REFERENCES

IL7072 BUSINESS EXCELLENCE MODELS

OBJECTIVES:
- To make the students to understand the business excellence models, which are applied in all aspects of business like manufacturing, software (IT) as well as service industry oriented organization like health centre, hospitality, etc.

UNIT I BUSINESS EXCELLENCE MODELS
Business Excellence Concepts – Need for BE models – Pioneers in the model MBNQA, EFQM and DEMING award

UNIT II MBNQA
Criteria :: LEADERSHIP, Strategic planning, Customer and Market focus, Measurement analysis and Knowledge Management, Human resource focus, process management, business results

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

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

UNIT V CASE STUDY/ MINI PROJECTS
Development of business excellence model for industrial application in production systems, inventory systems, maintenance and replacement systems, supply chain management etc.

OUTCOMES:
- After studying this subject, the students will get a clear idea about the business excellence models applied in the industries.

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
OBJECTIVES:

- To introduce basic statistical and multivariate methods.

UNIT I  STATISTICAL DATA ANALYSIS  9

UNIT II  BASIC CONCEPTS  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  REGRESSION AND FACTOR ANALYSIS  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  DISCRIMINANT AND CLUSTER ANALYSIS  9
Discriminant Analysis - Basic concepts – Separation and classification of two populations - Evaluating classification functions – Validation of the model.

UNIT V  ADVANCED TECHNIQUES  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

OUTCOMES:

- The students will gain knowledge on statistical data analysis and interpretation which help in effective decision making.

REFERENCES

OBJECTIVE:
- To impart knowledge on basics of DSS and Knowledge based 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.

OUTCOMES:
- The students will be able to make decisions in the semi structured and unstructured problem situations using systems and semantic networks.

REFERENCES:

OBJECTIVES:
- To study and understand the concept of Engineering Economics and apply in the real word.
- To gain knowledge in the field of cost estimation to enable the students to estimate the cost of various manufacturing processes.

UNIT I DEMAND ANALYSIS AND FORECASTING
UNIT II PRODUCTION FUNCTION AND COST ANALYSIS 9

UNIT III MARKET COMPETITION AND PRICING 9

UNIT IV PROFIT ANALYSIS 7
The concept of profit: Profit planning, control and measurement of profits. Profit maximisation – Cost volume profit analysis – Investment Analysis.

UNIT V COSTING 10
Job costing-Process costing-Operating costing-Standard Costing (variance analysis) and budgeting-. TOTAL: 45 PERIODS

OUTCOMES:
- Students will become familiar with principles of micro economics and cost estimation.
- They will be able to apply these principles to appreciate the functioning of product and input market as well as the economy.

REFERENCES:

IL7077 INDUSTRIAL SAFETY AND HYGIENE L T P C 3 0 0 3

OBJECTIVES:
- To impart knowledge on fundamentals of safety engg. and hygiene.

UNIT I OPERATIONAL SAFETY 9

UNIT II SAFETY APPRAISA LAND ANALYSIS 9
Human side of safety – personal protective equipment – causes and cost of accidents. Accidents prevention program – specific hazard control strategies – HAZOP training and development of

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


OUTCOMES:
- The students will get awareness on safety appraisal, analysis techniques, regulations and issues in occupational health and safety manager practices in industries.

TEXT BOOKS:

REFERENCES:
1. Occupational Safety Manual BHEL.
2. Industrial Safety and the law by P.M.C Nair Publishers, Trivandrum.
OBJECTIVES:

- To make the students acquire basic knowledge in lean and six sigma and make them understand the various phases involved in the implementations.

UNIT I  INTRODUCTION TO LEAN MANUFACTURING AND SIX SIGMA  9
Introduction to Lean- Definition, Purpose, features of Lean ; top seven wastes, Need for Lean, Elements of Lean Manufacturing, Lean principles, the lean metric, Hidden time traps. Introduction to quality, Definition of six sigma, origin of six sigma, Six sigma concept, Critical success factors for six sigma.

UNIT II INTEGRATION AND INITIATION FOR LEAN SIX SIGMA  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, Key elements of LSS, the LSS model and the benefits of lean six sigma. Initiation - Top management commitment – Infrastructure and deployment planning, Process focus, organizational structures, Measures – Rewards and recognition, Infrastructure tools, structure of transforming event, Launch preparation.

UNIT III RESOURCE PROJECT SELECTION AND TEAM BUILDING  9
Resource and project selection, Selection of Black belts, Training of Black belts and Champions, Identification of potential projects, top down (Balanced score card) and Bottom up approach – Methods of selecting projects – Benefit/Effort graph, Process mapping, value stream mapping, Predicting and improving team performance, Nine team roles and Team leadership.

UNIT IV THE DMAIC PROCESS AND TOOLS  9
The DMAIC process – Toll gate reviews; The DMAIC tools; Define tools – Project definition form, SIPOC diagram. Measure tools – process mapping, lead time/cycle time, pareto chart, cause and effect diagram, FMEA, IDEA - generating and organizing tools – Brainstorming, Nominal group technique, Motivating; Cause and effect diagram, Data collection and accuracy tools; check sheet, Gauge R&R; understanding and eliminating variation; run charts, control charts, process capability analysis. Analyze tools- scatter plots, ANOVA, regression analysis, time trap analysis. Improve tools – mistake proofing, Kaizen, Reducing congestion and delay, pooling triaging, backup capacity, set up time reduction (SMED), TPM, DOE and the pull system. Control charts – statistical process control.

UNIT V INSTITUTIONALIZING AND DESIGN FOR LSS  9
Institutionalizing lean six sigma – improving design velocity, creating cycle time base line, valuing projects, gating the projects, reducing product line complexity, Design for lean six sigma, QFD, Theory of Inventive Problem solving (TRIZ), Robust design - Case study presentations.

TOTAL:45 PERIODS

OUTCOMES:

- To develop a comprehensive set of skills that will allow students to function effectively by using lean techniques and six sigma for quantitative analysis.

REFERENCES:
IL7079 LOGISTICS AND DISTRIBUTION MANAGEMENT

OBJECTIVES:

- To gain understanding on principles and activities of logistics and Distribution Management

UNIT I CONCEPTS OF LOGISTICS AND DISTRIBUTION

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


UNIT III WAREHOUSING AND STORAGE

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

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

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 PERIODS

OUTCOMES:

- The students will gain knowledge on importance of logistics and distribution and various activities performed including Warehousing, transportation and operations management.

REFERENCES:

1. Alan Rushton, Phil Croucher and Peter Baker(Eds.),The Handbook of Logistics and Distribution Management, Kogan Page, 2010.
IL7080 MANAGEMENT ACCOUNTING AND FINANCIAL MANAGEMENT L T P C
3 0 0 3

OBJECTIVE

- To enable students to understand the accounting procedure, interpretation of financial accounting with cost account.

UNIT I FINANCIAL ACCOUNTING

UNIT II COST ACCOUNTING

UNIT III BUDGETING
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
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
Cost of capital – Capital structure – Dividend policy – Leasing.

TOTAL: 45 PERIODS

OUTCOMES:
- To possess the principles and techniques of accounting and managing finance in an organization

REFERENCES

IL7081 MULTI VARIATE DATA ANALYSIS L T P C
3 0 0 3

OBJECTIVE:

- To impart knowledge on the applications of multivariate statistical analysis

UNIT I REGRESSION
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
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.

OUTCOMES:
• Can apply the multivariate, regression, factor, discriminant and cluster analysis techniques for statistical analysis.

REFERENCES

IL7082  PRODUCTIVITY MANAGEMENT AND RE ENGINEERING  L T P C 3 0 0 3

OBJECTIVE:
• To introduce the basic principles of Productivity Models and the applications of Re-Engineering Concepts required for various organizations

UNIT I  PRODUCTIVITY
Productivity Concepts – Macro and Micro factors of productivity – Dynamics of Productivity - Productivity Cycle Productivity Measurement at International, National and Organization 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 Organizational 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  9
PMBOK, PASIM Model, Moen and Nolan Strategy for process improvement, LMICIP Model, NPRDC Model.

UNIT V  RE-ENGINEERING TOOLS AND IMPLEMENTATION  9
Analytical and process tools and techniques – Information and Communication Technology – Implementation of Reengineering Projects – Success Factors and common implementation Problem – Cases.

TOTAL: 45 PERIODS

OUTCOMES:
The Student must be able to:
- Measure and evaluate productivity
- Plan and implement various productivity techniques.
- Reengineer the process for improving the productivity
- Implement BPR tools for improving the productivity

REFERENCES:

IL7083  PROJECT MANAGEMENT  L T P C  3 0 0 3

OBJECTIVES:
- To outline the need for Project Management
- To highlight different techniques of activity planning

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

UNIT III  PROJECT IMPLEMENTATION  12
UNIT IV MONITORING AND INFORMATION SYSTEMS
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
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.

OUTCOMES:
• To apply project management principles in business situations to optimize time and resource utilization

TEXT BOOKS:

REFERENCES:

IL7084 RELIABILITY ENGINEERING

OBJECTIVE:
• To impart knowledge in reliability concepts, reliability estimation methods and reliability improvement methods

UNIT I RELIABILITY CONCEPTS

UNIT II LIFE DATA ANALYSIS

UNIT III RELIABILITY ASSESSMENT
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
UNIT V  RELIABILITY IMPROVEMENT

TOTAL: 45 PERIODS

OUTCOMES
- Students will be able to conduct reliability assessment and failure analysis on any complex systems.

REFERENCES:

IL7085  SERVICES OPERATIONS MANAGEMENT  

OBJECTIVES:
- To increase students’ understanding of the nature and importance of the service sector in the economy.
- To increase students’ analytical abilities in solving problems that service manager’s face

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

OUTCOMES:
- The students become effective decision maker in the management of a service organization.
- Students become aware of the environmental impacts and ethical issues involved in a service organization’s actions.

REFERENCES:
OBJECTIVES:

- To give a basic knowledge and system analysis, design and implementation.

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

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

OUTCOMES:

- The students will be able to design and manage information system and to apply them for business organizations.

REFERENCES:


OBJECTIVES:

- Study of this subject provides an understanding of the Technology Management principles to the various organizations.

UNIT I  INTRODUCTION  9
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

OUTCOMES:
Upon completion of the course, students will be able to
- Have clear understanding of managerial functions like planning, organizing, staffing, leading and controlling
- Have same basic knowledge on international aspect of management

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

IL7151 FACILITIES DESIGN

OBJECTIVES:
- To explain the basic principles in facilities planning, location, layout designs and material handling systems

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.

OUTCOMES:
- Students must analyse, design and apply layout principles for layout product, material handling and packaging.

REFERENCES:

QE7001 MAINTENANCE ENGINEERING AND MANAGEMENT

OBJECTIVES:
- To get a clear knowledge about the Maintenance engineering and Management techniques practiced in industries.

UNIT I  INTRODUCTION
Maintenance definition – Maintenance objectives and Scope – Challenges and functions of Maintenance management – Tero technology – Maintenance costs.

UNIT II  MAINTENANCE MODELS

UNIT III  MAINTENANCE LOGISTICS
UNIT IV  MAINTENANCE QUALITY

UNIT V  TOTAL PRODUCTIVE MAINTENANCE
TPM fundamentals – Chronic and sporadic losses – Six big losses – OEE as a measure – TPM pillars– Autonomous maintenance – TPM implementation.

OUTCOMES:
• The concept of Maintenance, Maintainability, Availability, and Reliability can be known while studying this subject.

REFERENCES:

QE7002  OPERATIONS SCHEDULING

OBJECTIVES:
• To give knowledge to students about the Scheduling techniques, algorithms, and Heuristics that are applied for operations management.

UNIT I  SCHEDULING BASICS

UNIT II  SINGLE MACHINE MODEL

UNIT III  PARALLEL MACHINE MODEL

UNIT IV  FLOW SHOP MODEL

UNIT V  JOB SHOP MODEL

TOTAL: 45 PERIODS
OUTCOMES:
- The concepts of scheduling and sequencing applied in operations management can be get cleared by this subject.

REFERENCES:

QE7003 PRODUCTION AND INVENTORY MANAGEMENT

OBJECTIVES:
- To gain knowledge in the area of Production and Inventory management through various tools and techniques.

UNIT I PROCESS MANAGEMENT
Operations strategy, types of processes, process management – outsourcing, make-buy decision, process re-engineering

UNIT II FORECASTING
Purpose and application of forecasts, types of forecasts, Delphi & Market surveys, Moving average and exponential smoothing methods, Linear Regression, monitoring of forecasts.

UNIT III PRODUCTION PLANNING
Aggregate planning problem, costs, strategies, graphical and tabular methods, transportation and linear programming methods, MRP, MRPII, CRP, ERP.

UNIT IV PRODUCTION CONTROL
Capacity planning and control, production activity control, JIT, flow shop & Job shop scheduling basic models.

UNIT V INVENTORY MANAGEMENT
Inventory classification and analysis, Basic inventory systems, deterministic and probability models.

TOTAL: 45 PERIODS

OUTCOMES:
- The Product and Inventory management techniques like Forecasting, MRP, ERP, JIT, etc. can be better known after studying this course.

REFERENCES:
OBJECTIVES:
- To facilitate the students in knowing the concepts of Software measurements, metrics, and analysis.

UNIT I  SOFTWARE MEASURES AND METRICS  
Measurement theory- Categories of data (Nominal data, Ordinal data, Absolute data (Attribute), Interval data, Ratio data (Continuous Data) - Aspects of Data Quality (correctness, Accuracy, precision, Consistency, Completeness, repeatability) - Base Measures (Size, Cost, Effort, Schedule, Defects, Resources and Changes), Product & Process Metrics.

UNIT II  METRICS FRAMEWORK  
Goal Question Indicator Metric (GQ (I) M) Framework- Data Collection & Analysis Plan- Data Collection Systems, Data Validation, Management by Metrics- Key Metrics for each project type

UNIT III  ANALYSIS AND IMPROVEMENTS  
Arriving Organizational capability baselines , Arriving Organization Norms – COQ, Productivity, Effort distribution , Phase wise Defect distribution - Using the baselines for Estimation and planning - continual improvement ,Corrective and Preventive actions

UNIT IV  ESTIMATION MODELS  
Types of Estimation – Effort estimation models – COCOMO-FPA-SLIM

UNIT V  PREDICTION MODELS  
Product Quality Prediction Models- Raleigh model, Exponential model

TOTAL: 45 PERIODS

OUTCOMES:
- The basic measurement techniques, metrics and analyses in software industry can be understood by this course.

TEXT BOOKS:

REFERENCES:
OBJECTIVE:

- To understand the importance of materials management system and its concepts

UNIT I INTRODUCTION

Introduction to materials management and productivity, functions, organization structures and role of material management. Materials and profitability and Profit center concept, Contribution to profits, policy manual, internal interface, External Environment, Centralized Purchasing, Decentralization, Delegations of powers.

UNIT II MATERIAL PLANNING

Material Planning, definition, influencing factors, use of standard deviation, Importance of materials Research, Advantages of MIS, Techniques of Materials Intelligence, Environment Conditions, Source of information, Materials requirement planning (MRP) and Manufacturing resource Planning (MRPII), Evolution to ERP and Distribution Requirements Planning (DRP), Pull systems.

UNIT III PURCHASING

Importance and objectives of good purchasing system, Prime and organizational functions, purchasing policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, role of purchasing in cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, Vendor relation and selection, vendor rating and standardization, vendor certification plans, supply reliability, developing new source of supply.

UNIT IV COST REDUCTION

Cost control vs Cost reduction, price analysis, material cost reduction techniques, variety reduction, cost reduction and value improvement, material holding cost, Acquisition cost, Settlement of Bills, Accounting, Audit in Materials Management, Internal Audit, Operational Audit, techniques of cost control, cost effectiveness, cost analysis for material management, material flow cost control.

UNIT V INVENTORY MANAGEMENT

Inventory vs Stores, Functions and types of inventory, Types of inventory control, Handling Uncertainties and safety stock, inventory build-up, EOQ for various inventory models, inventory models with quantity discount, exchange curve concept, coverage analysis, optimal stocking policies, inventory management of perishable commodities, ABC-VED analysis, design of inventory distribution systems, spare parts inventory management, information systems for inventory management, cases studies.

TOTAL: 45 PERIODS

OUTCOME:

- To introduce the concepts of materials management with the emphasis on the various material planning, purchasing policies, purchasing system and the concepts of materials management.

REFERENCES:


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**OBJECTIVES:**
- To get knowledge of Innovation in Product design and development.

**UNIT I PRODUCT DEVELOPMENT AND CONCEPT SELECTION**
- Product development process
- Product development organizations
- Identifying the customer needs
- Establishing the product specifications
- Concept generation
- 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

**OUTCOMES:**
- The need for innovation in Product design and development and the technology developed can be known by this subject.

**TEXT BOOK:**

**REFERENCES:**
OBJECTIVES:

- To understand the importance and advantages of applying simulation techniques for solving various problems on discrete event systems.
- To teach various random number generation techniques, its use in simulation, tests and validity of random numbers etc. development of simulation models, verification, validation and analysis.
- To understand the applications of random probability distributions in real time environments.
- Train students to solve discrete event problems through hand simulation and to develop simulation models using Extend simulation software.

UNIT I
INTRODUCTION:

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

UNIT II
RANDOM NUMBERS:

Methods of generating random numbers, Pseudo random numbers and random variates, discrete and continuous random probability distributions, tests for random numbers.

UNIT III
DESIGN OF SIMULATION:

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 SOFTWARE:

Study and selection of simulation languages, Use of simulation software such as GPSS, Extend, Matlab, Simulink, LabView etc., for simulation.

UNIT V
CASE STUDIES IN SIMULATION:

Development of simulation models for queuing systems, production systems, inventory systems, Industrial scheduling problems.

OUTCOMES:

Students will:

- Learn to simulate models matching real life scenarios and obtain superior results
- Develop capabilities of taking up consultancy projects

REFERENCES: