M.Sc. Total Quality Management Syllabus

Ist semester

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
1MSTQM01	TOTAL QUALITY MANAGEMENT & QUALITY TOOLS	40	60	100
1MSTQM02	QUALITY MANAGEMENT SYSTEMS	40	60	100
1MSTQM03	STATISTICAL PROCEDURES	40	60	100
1MSTQM04	TQM Practical Lab	60	40	100
Total		180	220	400

IInd semester

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
2MSTQM01	STATISTICAL QUALITY CONTROL & ASSURANCE	40	60	100
2MSTQM02	STATISTICAL APPLICATION RELIABILITY	40	60	100
2MSTQM03	Quality improvement Techniques tool and methods	40	60	100
2MSTQM04	TQM Practical Lab	60	40	100
Total		180	220	400

III rd semester

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
3MSTQM01	LEAN & SIX SIGMA QUALITY MANAGEMENT	40	60	100
3MSTQM02	DESIGN OF EXPERIMENTS AND RESEARCH METHDOLOGY	40	60	100
3MSTQM03	MEASUREMENT SYSTEM & ANALYSIS	40	60	100
Total		120	180	300

IV semester

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
4MSTQM01	INFORMATION SECURITY SYSTEMS & MANAGEMENT	40	60	100
4MSTQM02	PERFORMANCE MANAGEMENT & SYSTEMS	40	60	100
4MSTQM03	Software Product Quality planning & Assurance	40	60	100
4MSTQM04	PROJECT/INDUSTRY BASED PROJECT			100
Total		120	180+(100)	400

Semester I

TOTAL QUALITY MANAGEMENT & QUALITY TOOLS

Evolution of Quality - Historical Perspective, Basic Concepts of Quality, Vision, Mission and Objectives of an Organization, Corporate Structure in an Organization and Role of Quality

Quality Planning, Quality By Design, Quality Costs and Cost of Failure, Waste Control, How Quality Benefits Business

Quality and Competitiveness in Business, Zero Defects and Continuous Improvement, Role of Leadership and Commitment in Quality Deployment, Team Building, Motivation and Rewards, Total Employee Empowerment, Quality Functions - Measurement, Inspection, Testing, Calibration and Assurance

Design Control and Conformity, Tolerance and Variability, PDCA Cycle, Juran Trilogy, Crosby's 10 points and Deming's 14 Points Customers Requirements, Customer-Supplier and Chain Links, Establishing Customer Focus-Customer, Satisfaction, Measurement and Customer Retention

Product Liability, Total Quality Concepts and CWQC, Difference in Western And Japanese Approach of TQM, Basic Philosophy and Fundamental Models of TQM, Total Quality and Ethics

Internal Politics and Total Quality Management, Quality Culture, Education and Training

Implementing Total Quality Management - An Integrated System Approach

Total Preventive Maintenance

Reference Books

1. Total Quality Management by V.S Bagad Technical Publications, First Edition, Jan 2008
2. Total Quality Management by S. Rajaram Dreamtech Press,First Edition, Jan 2008

QUALITY MANAGEMENT SYSTEMS

Introduction to Modern Quality Management System
Historical Development of Quality Standards
ISO 9001:2000 Quality Management System Standards, Documentation, Implementation of ISO 9000:2000, Quality Management Systems,
Accreditation/Certification Quality Audit - Internal, Second Party, Third Party, and Surveillance Audit, Failure, Non-Conformance Analysis and Corrective Action
Environment Management System - ISO 14000, ISO 14001, QS-9000 Quality Standards, Quality System for Automotive Supplier - TS 16949, Quality System for Telecom Industries - TL 9000
Guidelines for Processed Material, Guidelines for Safety and Hazard (OHSAS),Quality Assurance Requirement for Measurement Equipment - Meteorological Confirmation System - ISO 10012-1
Guidelines for Control and Measurement Processes - ISO 10012-3
Quality Management - Guidelines for Training - ISO 10015, Hazard and Critical Control Points (HACCP)
Good Manufacturing Practices (GMP),Good Laboratory Practices (GLP) in Pharmaceutical Industries, Guidelines on Application in Food and Drink Industry

Reference Book:

1. Singhal and Singhal ISO 9001:2012(PH1 Learning System), 2e,2012

2. Juran's Quality Handbook by Joseph Juran , A. Blanton Godfrey, McGraw Hill, 1999

STATISTICAL PROCEDURES

Data Representation and Frequency Distribution, Histogram, Box-Plots, Stem Leaf Diagram
Measures of Central Tendency and Dispersion, Moments of a Frequency Distribution, Skewness and Kurtosis
Concepts of Population Sample, Elements of Probability Theory
Laws of Probability and Bayes Theorem, Random Variables and Probability Distributions
Mathematical Expectation, Discrete Probability Distributions - Bernoulli, Binomial, Poisson, Geometric, and Hyper Geometric
Continuous Probability Distributions - Normal, Exponential, Weibull, Raleigh, and Log-Normal
Sampling Distributions - Chi-Square, t and F – Distributions**,** Inter Relationships among various Probability Distributions

Reference Books:

1. Quality Control and Improvement, Amitava Mitra, A John Wiley & Sons, Inc.,2003
2. Quality Control & Application, B. L. Hanson & P. M. Ghare, Prentice Hall of India, 2009

TQM Lab

Exp. No. 1 Red Bead experint: Speculate the probability of distribution of beads w.r.t quantity of input, Quality of input, and analyze w.r.t application of 7 QC tools. Plot distribution graphs with qualitative statistics to substantiate data generated by red bead experintation.

Exp. No. 2 Funnel Experint: To plan and study the effect of

(a) Contingent adjustnt of funnel at the an of last five experints. Repeating to understand an of ans. Plot all scenarios.
(b) Continuous error correction, and study the role of compensation and under/over compensation.
(c) Study the effect of PDCA.
(d) Understand and plot consistency.

Exp. No. 3 Case study and presentation on PDCA Cycle with industry experience.

Semester II

STATISTICAL QUALITY CONTROL & ASSURANCE

Concepts of Reliability, Maintainability and Product Life Cycle, Statistical Basis for Control Charts, Causes of Variation - Special Causes and Common Causes, Concepts of Statistical Process Control, Use of Control Charts for Statistical Process Control

Concepts of Testing of Hypothesis, Type I and Type II Errors, Analysis of Patterns in Control Charts, Operating Characteristics (OC) Curves - Producer's Risk and Consumer's Risk, Operating Characteristics (OC) Curves for Attribute control Charts

Control Charts for Variables - X Bar-R Charts, X Bar-s Charts, Individual Item (MR) Charts, Control Charts for Attributes - p-Charts, np-Charts, c-Charts, u-Charts, U Bar Charts

Process Capability Analysis - Specification Limits, control Limits, Natural Tolerance Limits, Statistical Tolerance Limits, C_p, C_{pk}, CPU, CPL, C_{pm} Indices, Setting Tolerances for Assembly and Components

Statistical Tolerance Limits for Normal Distributions, Concepts of Sampling, Producer's Risk and Consumer's Risk

Acceptance Sampling Plans for Attributes - Single, Double and Multiple Sampling Plans, Chain, Sequential and Skip Lot Sampling Plans, Switching Rules, Acceptance Sampling Plan for Variable - Sampling Plans for Process Parameters and Sampling Plans for Acceptance of Lots

Evaluating Sampling Plans - AQL, AOQ, and AOQL, Taguchi's Loss Function

Reference Books:

1. Juran's Quality Handbook by Joseph Juran , A. Blanton Godfrey, McGraw Hill, 1999
2. Quality Control & Application by B. L. Hanson & P. M. Ghare, Prentice Hall of India, 2007

STATISTICAL APPLICATIONS RELIABILITY,

Product Reliability, Failure Rate and Product Life, Relationship to Quality Control, Reliability Measurement, Reliability Function, Reliability Prediction Methods, Reliability Engineering - Standardization, Redundancy, Physics of Failures, Reliability Testing, Burn-in, FMEA, Fault Tree Analysis

Life Testing and Reliability - Types of Tests, Failure Terminated Tests, Time Terminated Tests, Sequential Reliability Testing, Life Testing Plans using Exponential Distribution, Life Testing Plans using Handbook H-108, Sequential Life Testing Plans

System Reliability - Life Cycle Curves and Probability Distributions in Modeling Reliability - Exponential, Weibull, Raleigh, Gamma, Normal, Log-Normal, Reliability Improvement

Value Engineering

Maintenance and Maintainability, Maintainability Engineering ,Design for Maintainability, Maintainability Assurance

Qualitative and Quantitative Maintenance Requirements, Maintenance Engineering Analysis, Equipment Survival and Equipment Replacement

Reliability Management, Availability - Operational and Inherent, MTBF and MTTR Trade off, MTTR Prediction

Corrective Maintenance Analysis, Integrated Logistic Support, Life Cycle Costs, Support Requirements

Reference books:

1. The Reliability of Mechanical Systems, Edited by John Davidson, Published by Institution of Mechanical Engineers, London, 1994
2. Quality Control and Improvement, Amitava Mitra,A John Wiley & Sons, Inc., Publication 2004

QUALITY IMPROVEMENT TECHNIQUES: TOOLS ANDMETHODS

Guidelines for Quality Improvement (ISO 9004-4), Classification of Tools: Based on What It Will Achieve and According to Type, Basic (Old) Quality Tools and Practices: Tally Sheets, Check sheet, Check List, Bar Chart, Gantt Chart, Histogram, Pareto Analysis, Cause and Effect Diagram, Scatter Diagram, Flow Chart

Advanced(New) Quality Tools and Practices, Data Gathering: Brain Storming, Questionnaire, Suggestion Scheme, Supplier Survey, Relation Diagram, Tree Diagram,

Affinity Diagram, Matrix Diagram, Responsibility Matrix, Matrix Data Analysis Diagram, Process Decision Program Chart

Concepts of Off-line and On-line Quality, Planning and Preventative Tools: Quality Function Deployment (QFD), Fault Tree Analysis, FMEA (Design), FMEA (Process), Progravaluation and Review Technique (PERT), Critical Path Analysis (CPA) and Critical Path Method (CPM) and Why-How Chart, Balanced Score Card

Japanese Tools and Practices: JIT, ANDON, KAIZEN, JIDOKA, KANBAN, HOSHIN KANRI, POKA-YOKE, 5S

Quality Circles, Business Process Re-engineering (BPR), Bench-Marking, Zero Defect

Taguchi Loss Function, Orthogonal Arrays Overview of Six Sigma Quality Management

Reference Books :

1. Juran's Quality Handbook by Joseph Juran , A. Blanton Godfrey, McGraw Hill, 1999

TQM Lab

PART A

Exp. No. 1 On a microter / vernier caliper study the process, equipnt and operator errors, bias, Linearity etc, and in Varying situations discuss Geotrical dimensioning and tolerance.

Exp. No.2 Plot Customer dissatisfaction in a hospital scenario and study the root cause of prioritized problem. Or similar customer dissatisfaction problems in other area of student's interest.

Exp. No. 3 Design an alternative system for above using DFSS approach.

Exp. No. 4 Understand time deployment in various sub processes in a typical process, and find the opportunities analyzing value stream mapping, and applying cellular manufacturing.

Exp. No. 5 Application of system analysis through customer interviews in the scenario as in experiment 2, using QFD templates, and report CTQ's

Exp. No. 6 Selecting 5 processes in different domains, analyze how defects are defined, what kinds of defects are predominant; the root causes of defects, and analyze the strategies of reduction of DPU's sigma levels etc.

PART B

Computer Applications Using MS Excel / MINITAB

Syllabus as per Manuals of the concerned Software, 28 Exercises based on courses studied .

Semester III

LEAN & SIX SIGMA QUALITY MANAGEMENT

Overview of Six Sigma Methodology, Cultural Imperatives to Six Sigma, Six Sigma: The Power of Culture

Strategies for Effectively Implementing Six Sigma in an Organization, Understanding of Deployment Strategies – Business Goals/ Dashboards/ Balance, Business Score Card Or Customer Goals including Linkages With Financial Goals, Linkage of Six Sigma Methodology with Other Initiatives like Lean Concepts etc., Roles and Responsibilities In Six Sigma Implementation, Six Sigma Project Selection-Linkage to Strategy

Over View of Six Sigma Project Execution (DMAIC Or DFSS/ DMADV) (Define-Measure-Analyze- Improve & Control) , Design For Six Sigma, Define Measure Analyze Design and Validate)

Project Review , Guidelines and Selection of Belts for the Projects, Process of Closing the Project, Work Through a Sample Six Sigma Project

Lean Means Speed, Lean Six Sigma: Creating Breakthrough, Creating Competitive Advantage with Lean Six Sigma

Infrastructure and Deployment Planning, Establishing the Vision Company-Wide, Selecting the Right People and the Right Projects, Predicting and Improving Team Performance

Implementation: The DMAIC Improvement Process, Implementation: The DMAIC Tools, Institutionalizing Lean Six Sigma, Total Supply Chain Acceleration, Lean Six Sigma Logistics, Design For Lean Six Sigma

Reference Books:

1. The Certified 6 Sigma Green belt Handbook Roderick A Munro, Mathew J Maio, Mohamed B. Nawaz, Govindrajan Ramu, 2005
2. The Six Sigma Way Peter Pande, Robert Neuman, Roland Cavanagh, McGraw Hills ,2006

DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Introduction And Basic Principles:
Classification of experimental designs, Design and analysis of one factor experiments - Completely randomized and randomized complete block designs, Analysis of variance
Estimation Of Parameters:
Residual analysis and model checking, Sample size problem. Design with two blocking variables, Latin squares, Analysis of data from a Latin square.
Experiment With Two Factors:
Introduction, Main effects and interactions, Two-factor analysis of variance, Graphic analysis, Choice of sample size.
Design Of Experiment:
Design of Experiments with the help of orthogonal arrays, Taguchi's Robust parameter design, Analysis, Noise factors, Tolerance on control factors.
Research Methodology:
Nature and objective of research, Research topic, Literature review, Formulation of problem, Research design, Sampling techniques, Data collection, Statistical and sensitive analysis of data, Interpretation of result and report writing

Reference Books :

1. Taguchi Statistics in Research, Bernand Ostle and Richard N.Mensing 3e, 1975, Oxford & IBH Pub Co.
2. Probability and Statistics in Engineering, Hines, Montgomery, Goldsman and Borror, 4th ed, 2003, John Wiley & Sons.
3. Experimental design, Theory & application, Federer, 1955, Oxford & IBH pub Co.

MEASUREMENT SYSTEM & ANALYSIS

Introduction And Estimation Of Experimental Uncertainties:
Uncertainty analysis to specify the uncertainty for each instrument - method of equal effects. Instrument role in final uncertainty, Bias and the Tolerance, Confidence Limits and the Bias Linearity Gage R&R Studies, The Range Method, Range Exercise, Calculating the Repeatability & the Reproducibility, Percentage Error, Stability, Measurement Regions, Attribute Gage Study Short Method Long Method, Comparing Operators, Gage R & R Exercise.
Considerations For The Selection Of Instruments:
Cost of new instruments and sensors for acceptable uncertainty and sensitivity with lack of sensitivity to other independent variables. Accuracy and precision are limited by the hysteresis transducer instrument
Test Matrix And Sequence Replications And Repetition:
Order of test sequence over range of variable, trends in data, correlation of data with time of day! Replicate or repeat in a different random order. Discussion of case studies .

Reference books

1. Measurement Systems Analysis, Manual, Third Edition, March 2002.
2. Doebelin, E. O.Engineering Experimentation: Planning, Execution, and Reporting, McGraw-Hill Book Co., NY. 1995

Semester IV

INFORMATION SECURITY SYSTEMS & MANAGEMENT

Introduction And Information Security Requirements:
Intellectual property, types of information and knowledge as power. Internet Security. Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, modeling Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.
Conventional Encryption Principles:
Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.
Public Key Cryptography Principles:
public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service
Email Privacy:
Pretty Good Privacy (PGP) and S/MIME.
Ip Security Overview,:
IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.
Web Security Requirements
Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET). Firewall Design principles, Trusted Systems, Intrusion Detection Systems
Basic Concepts Of Snmp
SNMPv1 Commy facility and SNMPv3, Intruders, Viruses and related threats
Information Security Standardization:
ISO 27000:2005. Information Security Management Systems

Reference Books

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press) 2004.
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI 2nd Edition May 2002.
3. Principles of Information Security, Whitman, Thomson Cengage Learning, 4e,2011

PERFORMANCE MANAGEMENT & SYSTEMS

Introduction:
Performance Management(PM), Efficiency and effectiveness of processes, Organizations, Business Objectives, Human Resources, Metric, Key Performance indicators, Monitoring & Measurement; Step-by-step PM Process Checklist, Reporting, Dashboards
The Kpi Family Dimension:
Internal Business Benchmarks, External Industry Benchmarks, Productivity and Efficiency Measurements, Quality Measurements, Profitability Effectiveness, Timeliness and Effective Resource Utilization, Innovation and Technology.
The Human Factor:
Metrics for an Engaged Workforce, Employee Engagement and Productivity, Performance enhancement. Synergizing people, Role, Benefits Strategic Plan Key Result Areas Results, Measures or KPIs**,** Real-World Improvements Using KPIs, Distributing Knowledge Management Responsibilities, Getting Cooperation and Buy-In to KPI Objectives
Human Competence:
Engineering Worthy Performance, Performance Appraisals Catalytic Coaching: The modern thoughts in Performance Review Abolishing, 360 Degree Feedback
Knowledge Management & Development Measurements:
Performance Indicators (KPI's) and Common Metrics , Balanced Scorecard Systems .Case Studies
Strategic Performance Management Systems:
Emerging Issues viz. Governance, Empowerment and the Strategic Audit, Performance measurement and control, The scope of performance measurement, Performance analysis in not-for-profit Organizations and the public sector, Make-or-buy and other decisions
Performance Assessment By Awards:
Deming Application Prize, Rajiv Gandhi National Quality award, Malcolm Baldrige National Quality Award. Tata Excellence model Case Studies

Reference Books:

1. Strategic Human Resource Development: Srinivas Kandula PHI learning Jan 2001.
2. Performance Modeling Of Automated Manufacturing Systems Narahari, Y., Viswanadham, N, 2001
3. Performance Management : Concepts, Skills And Exercises Cardy, Robert L., Leonard, Brain Phi Learning, Delhi 2nd Edition. 2001

SOFTWARE PRODUCT QUALITY PLANNING ANDASSURANCE

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Introduction to SQA Framework and Standards:
SQA Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance – Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcom Balridge, 3 Sigma, 6 Sigma
Software Quality Assurance Metrics And Measurement:
Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs – Software Quality metrics methodology: Establish quality requirements, Identify Software quality metrics, implement the software quality metrics, analyze software metrics results, validate the software quality metrics – Software quality indicators – Fundamentals in Measurement theory
Software Testing Strategy And Environment:
Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing
Software Testing Methodology:
Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies and testing tactics checklist.
Software Testing Techniques:
Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing.
Software Testing Tools:
Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, J and Cactus.
Testing Process:
Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness.
Testing Specialized Systems And Applications:
Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse.

Reference Books:

1. Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers, 2003
2. Software Testing Techniques, by Bories Beizer, Second Edition, Dreamtech Press,1996.
3. Managing the Testing Process, by Rex Black, Wiley 3rd Edition,2000

PROJECT/INDUSTRY BASED PROJECT

Course Objectives:

A comprehensive report in any area from Manufacturing / Service, Industry/ construction/ Health care / Software Engineering etc as approved by the department.

Course Outcome:

As per specialization, each will be assessed by faculty members in an open presentation towards the end of the semester.