SARDAR PATEL UNIVERSITY

FACULTY OF SCIENCE
COURSE OF STUDY
NODAL DEPARTMENT: DEPARTMENT OF STATISTICS
RULES FOR MASTER IN QUALITY AND PRODUCTIVITY MANAGEMENT (MQPM)

R.QP1: A candidate who has passed the Bachelor’s degree examination in any faculty of this University under 10 + 2 + 3 or an examination recognized as equivalent thereto with at least 45 percent of marks will be considered eligible for admission to the “Master in Quality and Productivity (MQPM)” subject to other admission criteria prescribed in that behalf. In addition, the candidate should have studied at least one course in basic statistics/mathematics.

R.QP2: All the eligible candidates will have to appear at the written entrance test. The admission to MQPM will be done strictly on merit basis of the candidate’s performance in the entrance test.

R.QP3: The examination for the various theory papers and laboratory work will be conducted under semester system. For this purpose each academic year will be divided into two semesters.

R.QP4: The objective of evaluation in the MQPM Programme is not only to measure the performances of students but also to motivate them for better performance. Students are to be evaluated on the basis of class tests, quizzes, class participation, home assignments, project reports and Mid-semester and End-semester examinations.

The weightage of the mid-semester examination will be 30 marks. The remaining 20 marks will be for the other components of internal evaluation. The method of evaluation as well as weightage to be assigned to the remaining components of internal evaluation will be determined by the faculty teaching the course. The evaluation scheme of every course is to be announced to the candidates by the faculty for each course in the beginning of each semester.

No Candidate will be permitted to register for any semester examination for MQPM unless it is certified by the Course
Coordinator, MQPM and the Head, Postgraduate Department of Statistics on the basis of following requirements:

(i) That he/she has attended at least 75% of the total classroom sessions separately under each of the courses offered during semester. In case a candidate fails to meet the minimum requirement, he/she will have to repeat the respective semester.

(ii) That he/she has obtained at least 33% marks in the internal evaluation consisting of 50 marks separately in each course, conducted by the Department. A candidate, who fails to obtain 33% marks in not more than one course, may be allowed to appear at the University with the Head of the Postgraduate Department of Statistics.

R.QP5: External evaluation of the candidates will be done through the University Examinations as under:

(i) Candidates will be examined in each paper for 100 marks at the end of each semester.

(ii) There shall be comprehensive viva-voce examination of 50 marks pertaining to the subjects of a particular semester, to be held by the University.

(iii) Project work will be undertaken during semester IV. The project work will involve writing dissertation at the end of the project, which will be evaluated for 450 marks by the examiners appointed. In addition, there will be project viva for 200 marks.

R.QP6: The semester schedule will be done on following lines:

(i) The Course Coordinator and the Head of the department in consultation with other teachers of the department will prepare in the beginning of the year a detailed scheme of seminars, homework, quizzes, etc. and the Programme for the test examinations and the same will be announced to the candidates.

(ii) The records of the test examinations as well as seminars, homework, quizzes, etc. will be maintained by the department concerned.

(iii) Every candidate shall maintain a regular record of his practical work that shall be duly certified by the concerned faculty.
R.QP7: A candidate desirous of appearing at each semester examination may forward his/her application in the prescribed form to the Registrar through the Head of the University Post-graduate Department of Statistics on or before the prescribed date.

R.QP8: The final result for the award of the degree will be declared on the basis of the grand total of all the Theory papers, Practicals, Project work and viva-voce prescribed for all semester examinations.

R.QP9: Only those students who fail in not more than one course at each semester examination be allowed to keep terms at the next semester. No candidate will be allowed to reappear in course in which he/she has already passed.

R.QP10: Standard of passing:

(a) The standard of passing at the MQPM degree examination will be as under: To pass any semester for the MQPM degree, a candidate must obtain at least 35% marks at the University Examination and 40% marks in the aggregate of University and Internal examination in each course of Theory, Practical and Project work and 40% marks in Viva-Voce Examination.

(b) Award of Classes:

(i) The successful candidates will be placed in Second class if they obtain at least 50% or more but less than 60% marks in the aggregate of all the semesters examinations taken together.

(ii) The successful candidates will be placed in First Class if they obtain at least 60% or more but less than 70% of the total marks in the aggregate of all the semesters examinations taken together.

(iii) The successful candidates in First Class who obtain at least 70% or more marks in the aggregate of all the semesters examinations taken together will be declared to have passed the examination in First Class with Distinction.

R.QP11: A candidate who fails in more than one course in a particular semester will not be admitted for further study at a subsequent semester and will be required to reappear in the examinations for the courses in which he/she has failed.
**R.QP12:** A candidate failing in not more than one course at any semester examination will be promoted to the subsequent semester according to the following rule.
A candidate failing in any of the first two semesters will not be permitted to go to the Fourth Semester until he/she has cleared all the courses in these semesters.

**R.QP13:** The program is divided into four semesters. The courses to be offered in all the four semesters are as under:

**Semester I**

QP. 101. BUSINESS STATISTICS AND INFORMATION SYSTEM  
QP. 102 STATISTICAL METHODS FOR QUALITY & RELIABILITY  
QP. 103. MANAGEMENT OF PRODUCTIVITY  
QP. 104. PRACTICALS BASED ON QP.101 TO QP.103.

**Semester II**

QP.201. TOTAL QUALITY MANAGEMENT  
QP.202 PLANNING AND ANALYSIS OF INDUSTRIAL EXPERIMENTS  
QP.203 ISO 9000:2000 CERTIFICATION  
QP.204 STATISTICAL METHODS THROUGH SPSS

**Semester III**

QP.301 KNOWLEDGE DISCOVERY AND DATA MINING  
QP.302 DATA BASE MANAGEMENT SYSTEM  
QP.303 OPTIMIZATION TECHNIQUES  
QP.304 PRACTICALS BASED ON QP.301 TO QP.303

**Semester IV**

QP.401: PROJECT WORK

**Note:** Each theory or practical course is of 4 credits hours and of 150 marks. The Industrial Project is of 16 credits and of 650 marks.
**Detailed Syllabi:**

**QP. 101. BUSINESS STATISTICS AND INFORMATION SYSTEM**

Review of: Basic statistics, Probability and Probability distributions, Correlation and Regression, Testing of hypotheses

Nature and Scope of Marketing Research (MR) and Information System. Recurring and non-recurring problems. Role of research in marketing strategy.


Qualitative and Quantitative Research Methods. Commonly used research designs in MR. and data sources. Panel research, retail store audit, experimental and quasi-experimental designs. Syndicated data service organizations. Decision on Sampling methods and Sample size. Designing, developing and testing of research instrument. Harmonizing demographics.

QP.102 STATISTICAL METHODS FOR QUALITY & RELIABILITY


Elements of Reliability: Binary coherent structure, min path/cut sets/paths, lower/upper bounds for reliability functions, k-out-of-n:G, bridge structures, closure properties of coherent structures of IFRA components. Reliability availability of one unit system supported by one repair facility and one standby.

QP. 103. MANAGEMENT OF PRODUCTIVITY

1. The concepts of Management: Its nature and purpose, Levels and functions of management.
2. Planning: Essential of planning, Types of plan and planning process. Policy and strategies
4. Organizing: The nature of organizing, Formal and informal organization, the departmentation.
7. Controlling: Control process, Control technique and Information technology.
QP. 201. TOTAL QUALITY MANAGEMENT


REFERENCES

QP.202 PLANNING AND ANALYSIS OF INDUSTRIAL EXPERIMENTS

Analysis of single replicate $2^k$ full factorial experiments, total and partial confounding in $2^k$ full factorial experiments, Resolution of III, IV and V fraction of $2^k$ experiments.

Criterion in selecting factorial designs: Criteria based on the Spectrum of the information matrix A and D-optimality, criteria based on alias matrix.

Construction of layouts of orthogonal array experiments and associated linear graphs to study some of the main effects and first order interactions of $2^k$ designs which need not be resolution 3 designs.(design known as Taguchi designs) with special cases of $L_8$ and $L_{16}$.

$3^k$ full factorial designs. Total and partial confounding in $3^k$ factorial experiments. Construction of orthogonal arrays experiments involving three level factors with special cases of $L_9$ and $L_{18}$.

Roll of Central Composite Designs (CCD) as alternative to $3^k$ designs. Rotatability of CCD, Linear and quadratic Response surfaces, contour plots.

Roll of non-normality, Box-Cox transformation. Generalized linear models (GLIM) for exponential family of distributions.

QP.203 ISO 9000:2000 CERTIFICATION

ISO 9000 QUALITY MANAGEMENT SYSTEM OVERVIEW:
History and current status of ISO 9000 around the globe · Understanding the 20 requirements of the ISO 9000 Standard · Changes to the 1994 ISO 9000 Standard and their effects · Effects of ISO registration on your company.

ISO 9000 QUALITY MANAGEMENT SYSTEM IMPLEMENTATION:
Understanding the ISO requirements · How to plan for ISO 9000 implementation · choosing the right registrar for your organization · Concepts of third-party registration.

ISO 9000 QUALITY MANAGEMENT SYSTEM DOCUMENTATION:
Review of the ISO 9000 requirements for system documentation · Structure of a documented quality system · Development of a documentation strategy · Use of a standard organization and format that is readable and clear · Appropriate level of detail at each documentation tier · Techniques to achieve major savings in time and cost · Techniques for reducing resource requirements for document control.

ISO 9000 INTERNAL QUALITY AUDITING:
Analysis of the four requirements related to internal quality auditing · Designing an internal quality audit program · Effective auditing techniques · Completing a full audit through live audit simulation exercises · Evaluating the significance of audit findings · Improving communication skills during the audit presentation · Reporting the findings and evaluations.

ISO 9000:2000 AUDITOR/LEAD AUDITOR TRANSITION:
The changes from the 1994 Standard to the 2000 Standard are significant. There are changes in underlying principles that will require changes in audit practice among quality management system auditors. Learn the changes that have been made to the ISO 9000:1994 Standard, and the impact of those changes. In addition, interpretations of the ISO 9000:2000 Standard will also
be discussed in this RAB/IATCA certified course. Prerequisite: This course is designed for experienced, practicing auditors and is not for initial accreditation.

AS 9100 AEROSPACE QUALITY MANAGEMENT SYSTEM OVERVIEW:
AS 9000 was revised and renamed AS 9100 on November 1, 1999. Aircraft manufacturers may flow this standard down to all levels of suppliers. Key Topics include: Understanding AS 9100 requirements · Major differences between AS 9100 and ISO 9000 · Effects of AS 9100 on your company.

QS 9000 AUTOMOTIVE QUALITY MANAGEMENT SYSTEM OVERVIEW:
Key topics: History and current status of QS 9000 around the globe · Understanding the 20 requirements of the QS 9000 standard · How QS 9000 requirements go beyond the basic ISO 9000 standard · Description of the minimum quality system requirements that the Big Three auto manufacturers expect of their suppliers · Effects of QS 9000 registration on your company.

ISO 14000 ENVIRONMENTAL QUALITY MANAGEMENT SYSTEM OVERVIEW Key Topics: Understanding ISO 14000 requirements · Effects and benefits of ISO 14000 on your company · Implementation of ISO 14000 · Meeting ISO 14000 auditing requirements · Registering to ISO 14001.
QP.204 STATISTICAL METHODS THROUGH SPSS.

Introduction: Samples and the Population, Level of Measurement A Special Case: Rating Scales, Independent and Dependent Variables, Data Access.

Data Checking: Viewing a Few Cases, Minimum, Maximum and Number of Valid Cases, Identifying Inconsistent Responses, When Errors are Discovered, SPSS Missing Values Option

Describing Categorical Data: Frequency Tables and Bar Charts, Standardizing the Chart Axis, Pie Charts

Comparing Groups (Categorical Data): A Basic Two-Way Table, Chi-Square Test of Independence, Requesting the Chi-Square Test, Different Tests, Different Results? Association Measures Available within Crosstabs, Graphing Cross Tabulation Results, Three-Way Tables, Extensions

Exploratory Data Analysis: Interval Scale Data: Frequency Tables and Histograms, Exploratory Data Analysis, Options with Missing Values, Measures of Central Tendency, Variability Measures, Confidence Band for Mean, Shape of the Distribution, Stem & Leaf Plot, Box & Whisker Plot, Saving an Updated Copy of the Data

Mean Differences Between Groups I: (Simple Case) Logic of Testing for Mean Differences, Sample Size, Exploring the Different Groups, T-Test, Displaying Mean Differences, Paired T Test, Normal Probability Plots

Mean Differences Between Groups II: (One Factor ANOVA) Logic of Testing for Mean Differences, Factors, Exploring the Data, Running One-Factor ANOVA, One-Factor ANOVA Results, Post Hoc Testing of Means, Graphing the Results,

Mean Differences Between Groups III: (Two Factor ANOVA): Logic of Testing and Assumptions, How Many Factors? Interactions, Exploring the Data, Two-Factor ANOVA, The ANOVA Table, Observed Means, Presenting the Results

Bivariate Plots and Statistics: Reading the Data, Exploring the Data, Scatterplots, Correlations
Introduction to Regression : Introduction and Basic Concepts, The Regression Equation and Fit Measure, Residuals and Outliers, Assumptions, Simple Regression, Multiple Regression ,Residual Plots ,Multiple Regression Results, Residual and Outlier Results ,Summary of Regression Results ,Stepwise Regression, Stepwise Regression Results, Stepwise Summary.
QP.301 KNOWLEDGE DISCOVERY AND DATA MINING

Review of classification methods from multivariate analysis, classification and decision trees. Clustering methods from both statistical and data mining View points, vector quantization.
Unsupervised learning from Univariate and multivariate data, dimension reduction and feature selection.
Supervised learning from moderate to high dimensional input spaces, artificial neural networks and extensions of regression models, regression trees.
Introduction to databases, including simple relational databases, data warehouses and introduction to online analytical data processing.
Association rules and prediction, data attributes, applications to electronic commerce.

QP.302 DATA BASE MANAGEMENT SYSTEM

Introduction: File processing systems, data base systems and the evolution of database technology. Aims and importance of database technology, data independence, data sharing, data integrity, data redundancy control

Data Modelling: Conceptual model, Logical Model, External model, Physical model

Working with Data Base Management system: Creation and modification, Searching, sorting, indexing, setting system environment

Screens and Reports: Designing custom screens, creation and printing of reports, labels.

Data Base Programming: Managing strings, numbers and dates using built in functions, memory variables, Designing and developing programs, Debugging techniques, procedures files.

Application Development: Managing multiple data files, Macros, windows, menus, reports, etc.

References:

1. Database System Concepts,- H.F. Korth and S. Silberschatz :
2. Principles of Database System -J.D. Ullman
3. Introduction to Database System-C.L. Date
4. Fundamentals of Database System-Elmasri & Navthe :
QP.303 OPTIMIZATION TECHNIQUES

Linear programming: convex sets, supporting and separating hyper-planes, standard linear program and basic feasible solution, simplex algorithm and simplex method, two phase method, graphical solution, Charnes' M-technique. Duality in linear programming, duality theorems, dual simplex method, sensitivity and parametric linear programming problem (LPP).

Transportation and assignment algorithms balanced and unbalanced transportation problems, degeneracy, and Hungarian method of assignment, transshipment problems.

Integer linear programming, Gomory cut method, branch and bound method, Network flows, maximal flow in the network, labeling technique, connection between network flow and transportation, matrix solution.

Nonlinear programming. Quadratic programming, Kuhn – Tucker conditions, Algorithms (Wolfe's, Beale's and Fletcher's) for solving quadratic programming problem.

QP.401: PROJECT WORK

The students will be required to undertake practical project work in the field to learn practical aspects of the theory. For this purpose, they will be going to the industries and will be choosing problems related to quality and/or productivity and will be using the knowledge, which they have gained through the theory courses and will be arriving at satisfactory solutions to the problems.
Total number of seats for the course is 60.

The programme is to be run as per UGC/State Government rules. The fee to be paid per semester is as under.

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