**B.A./ B.Sc. (STATISTICS)**

**Program Objectives:**

The main objective of this program is to *show* students the application of statistics in various walks of life. Students *gain insight* to apply various statistical tools to research problems and *understand* how to *collect*, *describe*, *analyze* and *interpret* data.

They come to know of statistical organizations based in India and Abroad. They attain the *ability* to build statistical *knowledge* and are able to *apply* various distributions to *real life situations*.

The program is meant for students who want to *combine* their studies in mathematics with considerable involvement in real-world *applications* and computational simulations. Students will gain *knowledge* on a wide range of concepts in mathematical foundations, modelling and computational *methodology*, and *understanding* the links between *theoretical knowledge* and *application*.

The program will appeal to those who want to gain a balanced combination of analytical and *problem-solving* *skills* as well as soft *skills*.

**Program Specific Outcomes**

After successful completion of this program, students will gain the:

1. *Acquaintance* with some basic concepts in statistics, probability, correlation, regression.
2. *Knowledge* of some elementary statistical methods of *analysis* of data
3. Idea of *analysis* of data pertaining to attributes and to *interpret* the results.
4. *Ability* to *distinguish* between random and non-random *experiment*.
5. *Ability* to find the probabilities of various events, *understanding* the concept of conditional probability and independence of events and *distinguish* between univariate and bivariate probability distribution.
6. *Understanding* the *value* of correlation coefficient and its use in regression *analysis.*
7. *Understanding* the concept of multivariate distributions.
8. *Application* of correlation and regression theory in various fields.
9. *Understanding* some standard discrete probability distributions *with real life situations* and the concept of bivariate distribution and computation of *related* probabilities.
10. How to represent statistical data with *diagrams* and graphically and also with the help of MS-Excel.
11. How to *compute* various Measures of Central Tendency, Dispersion, Moments, Skewness and Kurtosis.
12. *Ability* to *compute* Correlation Coefficient, Regression Coefficient, Multiple and Partial correlation coefficient.
13. *Understanding* how to *interpret* summary statistics of computer output.
14. *Application* of statistical methods in different fields viz. Business, Industry, Medical Science, Government Planning and Policies etc.
15. *Knowledge* of the *collection* of data with respect to time and *techniques* used in *analysis* and forecasting of time series.
16. *Understanding* the notion of quality and its *importance* in industry and the *ability* to *differentiate* between process and product control and plotting of the various charts used in SQC.
17. The *ability* to *understand* vital statistics, computation of vital events and to *compute* index numbers.
18. The *ability* to *compute* mortality, fertility and *reproduction* rates and to *compute* tests based on large and small samples.

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| SEMESTER I | PAPER I | PROBABILITY |
| PAPER II | STATISTICAL METHODS |
| SEMESTER II | PAPER I | PROBABILITY DISTRIBUTIONS AND NUMERICAL ANALYSIS |
| PAPER II | *PRACTICAL BASED ON ALL THE PAPER OF SEMESTER I & II* |
| SEMESTER III | PAPER I | STATISTICAL INFERENCE |
| PAPER II | SURVEY SAMPLING |
| SEMESTER IV | PAPER I | ANALYSIS OF VARIANCE AND DESIGN OF EXPERIMENTS |
| PAPER II | *PRACTICAL BASED ON ALL THE PAPER OF SEMESTER III & IV* |
| SEMESTER V | PAPER I | REGRESSION ANALYSIS AND NON-PARAMETRIC METHODS |
| PAPER II | EDUCATIONAL STATISTICS AND QUALITY CONTROL |
| PAPER III | OPTIMIZATION TECHNIQUES |
| SEMESTER VI | PAPER I | OPERATIONS RESEARCH |
| PAPER II | APPLIED STATISTICS |
| PAPER III | *PRACTICAL BASED ON ALL THE PAPER OF SEMESTER V & VI* |

**PROBABILITY**

**Course Outcomes:**

Upon completion of this course, students will be able to explain the concept of probability, calculate the probability of simple events, calculate the probability of compound events, calculate the probability of complementary events and familiarize himself/ herself with the four approaches to probability theory and particularly, the axiomatic approach.

**STATISTICAL METHODS**

**Course Outcomes:**

This course will present statistical methods that have proven to be of value in the field of knowledge discovery in databases, with special attention to techniques that help managers to make intelligent use of these repositories by recognizing patterns and making predictions.

**PROBABILITY DISTRIBUTIONS AND NUMERICAL ANALYSIS**

**Course Outcomes:**

Upon completion of this course, students will learn about various univariate distributions. They will also learn about distribution of function of random variables, bivariate normal distribution & its properties. At the end of this course the student will be familiar with the calculus of finite differences, Newton’s forward & backward formula, elementary numerical methods for interpolation, function approximation and numerical integration.

**STATISTICAL INFERENCE**

**Course Outcomes:**

Upon completion of this course, the students will be able to explain the concept of estimation of parameters, calculate the problems related to point estimation and interval estimation, explain the concepts of testing of hypotheses, (large sample tests small sample test), solve the problems related to testing of hypotheses, (large sample tests small sample test) and hypothesize various advanced statistical techniques for modelling and exploring practical situations.

**SURVEY SAMPLING**

**Course Outcomes:**

Upon completion of the subject, students will be able to: understand and interpret real-life survey reports from public agencies, understand concepts and techniques in sampling methods, assess the appropriateness of sampling plans with special reference to survey goals, sampling frames availability, and resource constraints, understand solution methodology to estimate population parameters for sampling plans and conduct sample surveys within the context of socially acceptable professional and ethical practices.

**ANALYSIS OF VARIANCE AND DESIGN OF EXPERIMENTS**

**Course Outcomes:**

After successfully completing this course, students will learn how to plan, design and conduct experiments efficiently and effectively, and analyze the resulting data to obtain objective conclusions. Both design and statistical analysis issues will be discussed. Particular attention will be paid to: understanding the process of designing an experiment including factorial and fractional factorial designs; examining how a factorial design allows cost reduction, increases efficiency of experimentation, and revealing the essential nature of a process.

**REGRESSION ANALYSIS AND NON-PARAMETRIC METHODS**

**Course Outcomes:**

This course focuses on building a greater understanding, theoretical underpinning, and tools for applying the linear regression model and its generalizations. With a practical focus, it explores the workings of multiple regression and problems that arise in applying it, as well as going deeper into the theory of inference underlying regression and most other statistical methods. The course also covers new classes of models for binary and count data, emphasizing the need to fit appropriate models to the underlying processes generating the data being explained.

**EDUCATIONAL STATISTICS AND QUALITY CONTROL**

**Course Outcomes:**

On completion of this course, the students will be able to: To realize the importance of significance of quality; Manage quality improvement teams and Identify requirements of quality improvement programs. Students will learn how organizations can develop excellence through the adoption of continuous improvement and process management. The course analyzes and uses various process management techniques, continuous improvement tools, and strategies to improve quality.

**OPTIMIZATION TECHNIQUES**

**Course Outcomes:**

At the end of this course, students will understand the theory of optimization methods and algorithms developed for solving various types of optimization problems, to develop and promote research interest in applying optimization techniques in problems of Engineering and Technology, to apply the mathematical results and numerical techniques of optimization theory to concrete problems.

**OPERATIONS RESEARCH**

**Course Outcomes:**

After successfully completing this course, students will be able to Identify and develop operational research models from the verbal description of the real system. They will be able to Understand the mathematical tools that are needed to solve optimization problems. They will be able to use mathematical software to solve the proposed models and develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

**APPLIED STATISTICS**

**Course Outcomes:**

Upon completion of the program, students should be able to understand time series and its different components. Students will have an idea of trend and be able to determine trend. Various methods for construction of seasonal indices will also be taught. They will also be able to learn about Index Numbers and its applications. They will also be able to apply tests for good index number. They shall gain an understanding on sources of demographic data, measurements of fertility and mortality along with life tables; its features and constructions.