Sophia College (Autonomous)

Mathematics & Statistics

FYBSc Maths Paper I

Semester I

CALCULUS I

Course Objectives:

1. To develop in the learner an understanding of the structure of the real number system.
2. To develop in the learner an understanding of the characteristics of various mathematical functions and plot their graphs.
3. To enable in the learner the knowledge of the concepts of limits of a function and the nature of continuous functions.

Course Outcomes

1. The learner should be able to understand the structure of the real number system.
2. The learner is able to understand the characteristics of the functions and plot their graphs.
3. The learner can calculate the limits of a function and find the nature of continuous functions.

Sophia College (Autonomous)

FYB.Sc Maths Paper II

Semester I

Algebra and Discrete Mathematics I

Course Objectives:

1. To develop in the learner an understanding of the discrete number system.
2. To develop in the learner an understanding of the characteristics of various mathematical relations and their applications.
3. To enable in the learner the knowledge of polynomials and their properties.
4. To enable the learner to understand the applications of complex numbers in polynomials.

Course Outcomes:

1. The learner understands the structure of the discrete number system and the various properties on divison in integers.
2. The learner will be able to identify the various types of relations on discrete systems.
3. The learner will be able to work on various binary operations of polynomials and find the roots of the polynomials.
4. The learner will be able to apply the concepts of complex numbers in polynomials.

Sophia College (Autonomous)

FYBSc

Maths Paper I

Semester II

CALCULUS II

Course Objectives:

1. To develop in the learner, an understanding of the concepts of derivative of a function.
2. To impart knowledge of the methods of finding the higher order derivative of the given function.
3. To enable the learner understands the applications of the derivative of a function.
4. To develop an understanding of the concepts and application of Mean Value theorems.

Course Outcomes:

1. The learner can find the derivative of a function on the set of real numbers.
2. The learner will be able to find the higher order derivatives of the functions
3. The learner will be able to apply the various concepts of differentiation on the functions to find the nature of the function.
4. The learner will be able to apply the concepts of Mean Value theorems and find the approximate value of the function at a certain point.

Sophia College (Autonomous)

FYBSc

Maths Paper II

Semester II

Algebra and Discrete Mathematics II

Course Objectives:

1. To understands the concepts of recurrence relations and apply the results in the counting problems.
2. To enable the learner to apply the various types of counting principles on discrete systems.
3. To develop an understand the concepts and applications of permutation maps on discrete sets .
4. To apply the various concepts of counting principles along with the principle of Inclusion-Exclusion and find solutions to the problems based on them.

Course Objectives:

1. The learner will understand the results of recurrence relations and apply the results in the counting problems.
2. The learner will be able to apply the various types of counting principles on discrete systems.
3. The learner will understand the concepts and results of permutation maps and apply them to different mathematical problems on discrete sets .
4. The learner will connect various concepts of counting principles along with the principle of Inclusion-Exclusion and find solutions to the problems based on them.

Sophia College (Autonomous)

Statistics

SEMESTER – I

FYBSc & FYBA

DESCRIPTIVE STATISTICS-1

Course Objectives:

- To introduce the techniques of data collection and its presentation.
- To emphasize the need for numerical summary measures for data analysis.
- To learn to present the data graphically.
- To understand and apply the descriptive techniques of statistical analysis to the given data.

COURSE OUTCOMES:

Through this paper, the learner will be able to

- Distinguish between different types of scales of the characteristics.
- Compare the different types of data and describe various methods of data collection.
- Construct Univariate and Bivariate frequency distribution, Cumulative frequency distribution.
- Create appropriate graphical representation of the given data.
- Compute and interpret the relation between the qualitative characteristics in the data.
- Comprehend , compute and interpret the measures of central tendency and dispersion.
- Identify the nature of skewness and kurtosis of the data -mathematically & graphically.

Sophia College (Autonomous)

SEMESTER – II

FYBSc & FYBA

DESCRIPTIVE STATISTICS-2

COURSE OBJECTIVE:

- To understand the nature and magnitude of relationship between the quantitative characteristics in the data.
- To create suitable mathematical models that best represents the data given.
- To enable the learners to understand forecasting techniques to predict trend and seasonal variation in the time series.
- To enable the learners to understand the construction of index numbers & its applications in various field.

COURSE OUTCOMES:

Through this paper, the learner will be able to

- Compute the numerical measures to identify the direction and strength of linear relationship between two variables.
- Build a simple linear regression model and interpret regression coefficients and coefficient of determination.
- Identify the relevant mathematical model which fits the data.
- Identify various components of time series.
- Apply the appropriate methods to evaluate the impact of the different components of time series on the data.
- Comprehend the construction of different index numbers and to apply the methods in different situations.

Sophia College (Autonomous)

FYBSC/ SYBA

Statistics Paper II

STATISTICAL METHODS-1

SEMESTER I/III

COURSE OBJECTIVE :

- To understand the basic concepts of probability and compute probability in various situations.
- To learn the various concepts involved in creating the probability distribution of discrete random variables.
- To learn the properties of the standard probability distributions of discrete random variables.
- To fit appropriate distribution to the given data sets and interpret the results.

COURSE OUTCOMES:

A student completing this course will be able to

- Differentiate between random and non-random experiments.
- Compute the probabilities of various types of events.
- Understand the concept of a discrete random variable and its probability distribution.
- To compute different measures of the probability distribution using techniques involving discrete random variables.
- Apply standard discrete probability distributions to data based on real life situations.

Sophia College (Autonomous)

SEMESTER II/IV

FYBSC/ SYBA

Statistics Paper II

STATISTICAL METHODS-2

COURSE OBJECTIVE :

- To learn the various concepts involved in creating the probability distribution of continuous random variables.
- To learn the properties of the standard probability distributions of continuous random variables.
- To understand the significance of the normal distributions and its application in data analysis.
- To introduce two branches of Statistical Inferential theory – Estimation theory and Testing of hypothesis.
- To assess population characteristics on the basis of sample using estimation and hypothesis testing theory.

COURSE OUTCOMES:

A student completing this course will be able to

- Create a probability density function and compute the cumulative distribution function for a continuous random variable.
- Apply the properties of standard continuous probability distributions to different data based on situations.
- Distinguish between point estimation and interval estimation of the population parameters.
- Frame a hypothesis and compute the probabilities of error that could arise while testing.
- Test the hypothesis by examining one or two random samples of the population.
- Apply hypothesis testing to interpret and draw conclusions about the population using sample data.
- To identify whether observed data follows the predicted probability distribution.
- To test whether the qualitative characteristics are associated with each other.

Sophia College (Autonomous)

SYBA Statistics Paper III

OPERATIONS RESEARCH AND INDUSTRIAL STATISTICS-1

SEMESTER III

COURSE OBJECTIVE :

- To orient students with different optimization techniques which will influence the overall quality of decisions.
- To learn different mathematical models for efficient allocation of limited resources.
- To learn techniques to minimize the cost of transporting goods from different sources to different destinations.
- To understand the methods of solving different assignment problems.
- To learn techniques to sequence the various jobs in order to minimize the total time taken for processing the jobs.

COURSE OUTCOMES:

A student completing this course will be able to

- Formulate a mathematical model for a given data.
- Solve and find optimum solution to a linear programming problem graphically and using mathematical techniques.
- Obtain the dual model of the given problem.
- Find optimal solutions using various methods to a transportation problem.
- Formulate an assignment problem and solve using Hungarian method.
- Process a solution to a sequencing problem using Johnson's Method.

Sophia College (Autonomous)

SEMESTER IV

SYBA Statistics Paper III

OPERATIONS RESEARCH AND INDUSTRIAL STATISTICS-2

COURSE OBJECTIVES:

- To understand the techniques of planning, scheduling and controlling the various factors of different activities of a project.
- To be acquainted with skills in strategy planning and decision making.
- To learn the techniques of evaluating the different options available for performing a task.
- To analyze situations in which players make decisions that puts them in the most preferred position.
- To learn to create and evaluate different strategies involved in planning using techniques of game theory.

COURSE OUTCOMES:

A student completing this course will be able to

- Construct activity networks for the project using probabilistic and deterministic time estimates
- Identify the critical activities of the project using different techniques.
- Optimize the project cost and time (any two variables).
- Update the project schedule after incorporating the changes in various factors of the activities.
- Distinguish between pure strategy and mixed strategy game and finding optimum game strategy.
- Understand different decision –making models and make effective decisions.