PROGRAMME OUTCOMES AND COURSE OUTCOMES

2022 – 2023

Name of the Programme: B.Sc. STATISTICS

Programme Outcomes:

PO 1	Apply acquired scientific knowledge to solve complex issues.
PO 2	Attain Analytical skills to solve complex cultural, societal and environmental issues.
PO 3	Employ latest and updated tools and technologies to analyse complex issues.
PO 4	Demonstrate Professional Ethics that foster Community, Nation and Environment Building Initiatives.

Programme Specific Outcomes:

PSO1	Gain broad knowledge and understanding in pure Mathematics and applications of Mathematics.
PSO 2	Demonstrate a computational ability and apply logical thinking skills to solve problems that can be modelled Mathematically
PSO 3	Read, understand, analyse and formulate Mathematical theorems
PSO 4	Acquire proficiency in the use of technology to assist in learning and investigating, Mathematical ideas and in problem solving.
PSO 5	Communicate Mathematical concepts accurately, precisely and effectively with clarity and coherence both verbal and in written form

COURSE OUTCOMES

Course Code	Course Title	Course Outcomes
19ST1CC1	Basic Statistics	CO1: Recognizes investigation, investigator,enumerator explain different methods of data collection. CO2: Identifies the need of Classification andTabulation CO3: Construct and analyze graphicaldisplay to summarize data. CO4: Explain and evaluates various measureof central tendency CO5: Compute and interpret measure ofcentre and spread of data.

19ST1CC2	ProbabilityTheory	CO1: Identify from a probability scenario events that are simple, complementary, mutually exclusive, and independent. CO2: Recognize multiplication rule for two independent events, the addition rule for union of two events, and the complement rule. CO3: Describe the main properties of probability distribution and random variables. CO4: Apply general properties of the expectation and variance operators. CO5: Identify and examine generating functions and law of large numbers.

22G1ACST1	Calculus	CO1: Able to differentiate the given functions. CO2: Explain higher derivatives and apply Leibnitz theorem to find the nth derivative of functions. CO3: Able to evaluate the definite integrals. CO4: Construct reduction formula for trigonometric functions. CO5: Define Jacobian, double & triple integrals and apply the knowledge of change of variables to solve the problems in double and triple integrals.
19ST2CC3	Descriptive Statistics	CO1: Evaluates and interprets the nature of skewness and kurtosis. CO2: Identify the direction and strength of a correlation between two factors. CO3: Compute and interpret the spearman

		correlation coefficient. CO4: Recognize regression analysis applications for purpose of description and prediction. CO5: Explain the methods of association of attributes.
19ST2CC4	Discrete Probability Distribution	CO1: Recognize cases where the Binomial distribution could be an appropriate model. CO2: Able to apply the Poisson distribution to a variety of problems. CO3: Explore the key properties such as the moment generating function, cumulant of a negative binomial distribution. CO4: Understand and derive the formula for the geometric and hypergeometric probability mass function. CO5: Explain and evaluate multinomial and power series distribution.
19ST2AC2	Algebra	CO1: Identify binomial series and solve problems in binomial expansion. CO2: Identify logarithmic and exponential series and solve problems.

		CO3: Relate the roots and coefficients of the equations and Recognize the important methods in finding roots of the given polynomial. CO4: Explain the transformations of equations. CO5: Examine the nature of the roots and solve algebraic equations using Newton's method and Horner's method.
19ST1NME, 19ST2NME	Fundamentals of Statistics	CO1: Summarize the origin of statistics and its relation with other disciplines. CO2: Explain and evaluate various measure of central tendency. CO3: Examine the various measures of dispersion. CO4: Identify the direction and strength of a correlation between two factors. CO5: Form regression equation of lines and solve.
19ST3CC5	Continuous Probability distribution	CO1: Recognize cases where the normal distribution could be an appropriate. CO2: Understand and derive the moments ,moment generating functions, characteristic functions of rectangular, beta and gamma

		distribution. CO3: Explore the key properties such as the moment generating function and cumulants of exponential and Cauchy distribution. CO4: Derive chi square distribution and apply in real life problem. CO5: State and apply the definitions of the t and F distributions.
19ST3CC6	Sampling Theory	CO1: Illustrate census and sampling and their advantages and disadvantages. CO2: Differentiates the SRS WOR, SRSWR, methods of SRS – lottery method and random number table method. CO3: Understand and identify stratified random sampling. CO4: Understand and identify systematic sampling. CO5: Analyse ratio estimator.
19ST3AC3	Linear Programming	CO1: Formulate linear programming problems and solve by graphical method. CO2: Classify simplex method to solve linear programming problems. CO3: Identify and solve two phase and Big–M method.

		CO4: Recognize and formulate transportation and find the optimal solution. CO5: Recognize and formulate assignment problems and find the optimal solution.
19ST3SB1	Practical Statistics I	CO1: Calculate measure of central tendency. CO2: Classify measures of dispersion, skewness and kurtosis. CO3: Compute correlation, regression and measures of association of attributes.

19ST4CC7	Estimation Theory	CO1: Explain and compute point estimation. CO2: Estimate maximum likelihood estimator. CO3: Analyse minimum variance unbiased estimator. CO4: Compute interval estimation in large samples using normal distribution. CO5: Distinguish Interval estimation in small samples based on F, chi square and t distribution.
22ST4CC8	Applied Statistics	CO1: Fitting of Linear trend and Calculation of Moving Average. CO2: Understand the calculation of seasonal variations using different methods and able to find cyclic fluctuations. CO3: Apply the concept of Index numbers uses and its applications. CO4: Prepare cost of living index and other index numbers for real life situations. CO5: To estimate the national income and to analysis its difficulties.
19ST4AC4	Linear Algebra	CO1: Define Vector Space and explain its

		various concepts. CO2: Explain basis and dimension. CO3: Illustrate Inner Product Spaces. CO4: Define basic concepts of matrices and solve linear equations, Appraise Eigen Value and Eigen Vectors of matrices. CO5: Describe bilinear forms and quadratic forms.
22ST4SB2	Sampling Distribution	CO1: Recall the definition of a t statistic in terms of statistics of a sample from a normal distribution. CO2: State and apply the definitions of the t, F and Chisquare distributions in terms of the standard normal. CO3: Explain the relation between t, f and χ^2
19ST5CC9	Testing of Hypothesis	CO1: Describe the process of hypothesis testing and given a statement of a research question, construct an appropriate null and alternative hypothesis to use for hypothesis testing. CO2: Explain best critical region and carryout UMP test for the parameters of univariate normal and exponential

		distribution. CO3: Explain LRT and its properties and test mean and variance of normal population. CO4: Analyse the basic properties of non parametric statistical techniques Illustrate the significance level as the probability of rejecting a true null hypothesis. CO5: Illustrate Sequential probability ratio test.
19ST5CC10	Design of Experiments	CO1: Define and recognize the terminology of experimental design. CO2: Apply and interpret the methods of analysis of variance. CO3: Analyse CRD, RBD and LSD. CO4: Analyse missing plot technique IRBD and LSD. CO5: Design and conduct two level functional factorial designs, split plot design.
19ST5CC11	Demography	CO1: Explain sources of demographic data. CO2: Apply fertility measurements such as

		CBR, TFR, GRR and NRR. CO3: Compute mortality measures CDR, SDR and infant mortality rate. CO4: Construct the demographic table. CO5: Explain the factors affecting migration and the basic ideas of Stationary and Stable population.
19ST5CC12	Real Analysis	CO1: Describe fundamental ideas and theorems on sequences. CO2: Distinguish convergent and divergent sequences. CO3: Distinguish convergent and divergent series. CO4: Explain the concept of limits and metric space and their roles in the real line.

		CO5: Organize theorems in a correct mathematical way.
19ST5ME1	Computer Programming in C	CO1: Explain various data types and operators in C. CO2: Summarize DecisionMaking Branching, looping statements and arrays. CO3: Categorize function, pointers and structures. CO4: Describe Strings and String Handling Functions. CO5: Create C program for real life problems.
22ST5ME3	Object Oriented programming with C++	CO1: Define the features of C++ supporting object oriented programming. CO2: Describe classes and objects. CO3: Distinguish Constructors and Destructors and Explain overloading

		concepts. CO4: Classify Inheritance in C++. CO5: Design C++ programs for real life situations.
19ST5SB3	Practical Statistics III	CO1: Analyze the problems based on confidence interval for proportions, mean, variances and correlation coefficient. CO2: Apply and interpret the methods of curve fitting, timeseries. CO3: Analyze the problem based on vital statistics.
19ST5SB4	Statistical Software-SPSS	CO1: Understand how to start SPSS and record variables and prepare data for analysis. CO2: Conduct descriptive and basic inferential statistics. CO3: Carry out statistical analysis that can test hypothesis and analyze factorial experiments.

19ST6CC13	Statistical Quality Control	CO1: Describe the use of control charts. CO2: Demonstrate the ability to design, use and interpret control charts for variables. CO3: Identify the difference between $\bar{X}$,R, p,np and C charts. CO4: Explain the process of acceptance sampling and describe the use of OCcurve. CO5: Make use of the concept of Reliability and examine its uses in problems of quality and cost.
19ST6CC14	Stochastic Processes	CO1: Explain the concept of stochastic processes and stationary and appreciate their significance. CO2: Compute probabilities of transition between states and identify classes of states in Markov chains and characterize the classes. CO3: Generalization of independent Bernoulli trails. CO4: Explain Poisson process and its related

		distributions. CO5: Demonstrate the knowledge in Pure and Death process.
19ST6CC15	Actuarial Statistics	CO1: Calculate quantities such as SI &CI, nominal and effective rates of interest and simple discount. CO2: Recognize simple assurance and annuities contracts and develop formulae for the present value of payments. CO3: Explain the concepts of redemption of loans. CO4: Construct the demographic statistics and premiums. CO5: Describe the policy values and its types.
19ST6ME5	Numerical Methods	CO1: Solve algebraic and transcendental equations using various methods. CO2: Identify the various methods of solving simultaneous linear algebraic equations. CO3: Recognize difference operators and apply the concept of interpolation. CO4: Compute the values of the derivatives at some point using numerical differentiation and integration.

		CO5: Compute numerical solution of differential equation
19ST5ME6	Multivariate Analysis	CO1: Derive the important properties of multivariate normal distribution. CO2: Compute hotelling T^2 statistics test on mean vector and multivariate normal population. CO3: Understand how to assess the efficacy of a classification and discrimination analysis. CO4: Introduce principal components analysis and clustering methods. CO5: Explain and Analyse contingency tables.
19ST6ME7	Regression Analysis	CO1: Classify and compute simple,multiple and partial correlation. CO2: Evaluate the regression model and estimate the standard error. CO3: Apply multiple linear regression analysis and classify simple linear regression analysis and multiple linear

		regression analysis. CO4: Test equality of regression coefficients
19ST6ME8	Operations Research	CO1: Define sequencing problem and apply it to solve real life problems. CO2: Solve problems in decision making. CO3: Apply inventory control to solve practical problems. CO4: Classify queuing models. CO5: Explain CPM and PERT to plan schedule and control project activities.
19ST6ME9	Industrial Statistics	CO1: Summarize the concept of deterministic models when the demands occur uniformly with and without shortage costs. CO2: Explain the policy for production planning when inventory levels are reviewed periodically. CO3: Demonstrate the concept of forecasting and its applications in manufacturing and nonmanufacturing industrial situations. CO4: Classify survival functions and

		hazard functions
19ST6ME10	Econometrics	CO1: Ability to perform analyses of economic data based on broad knowledge of the linear regression model. CO2: Estimate and test regression model. CO3: Assess the appropriateness of a linear regression model by defining residuals and examining the residual plot graphs. CO4: Check the existence of multicollinearity in a data set can lead to less reliable results due to larger standard errors. CO5: Articulate the null and alternative hypotheses for the Durbin-Watson (DW) test.
19ST6SB5	Practical Statistics IV	CO1: Analyze the problems based on statistical quality control. CO2: Examine various non parametric tests. CO3: Examine various non parametric tests.

19ST6SB6	Statistical Software - R	CO1: To impart efficient Data Handling Techniques. CO2: To equip students to Statistical Programming Skills based on examples and data sets. CO3: Able to explore results using ANOVA and ANOCOVA.
22ST2SL1	Quantitative Aptitude and Data Interpretations	CO1:Can interpret the data in picture format CO2: Understand Venn diagram and Casselet data. CO3:Able to compute Permutations and Combination. CO4:Understand the share value and brokerage. CO5:Able to find the present worth , bankers' discount and gain.

19UGSLST1	Official Statistics	CO1:Understand the function of various Indian statistical organisations. CO2:Knows the procedure of collecting informations. CO3:Able to understand the method of National Income and its estimates. CO4:Find different methods of collecting population census. CO5:Understand various sources and limitations of Industrial statistics.
19UGSLST2	Bio Statistics	CO1:Understand the study design and its risk value. CO2:Measures the accuracy of diagnosis through chi-square method. CO3:Estimate the different phases of cinical trials. CO4:Understand the survival distributions

		and its parameters. CO5:Able to estimate the survival function and its variance using various methods.
22UGSLST1	Differential Equations	CO1:Able to solve homogenuous and non-homogenuous differential equations. CO2:Compute solutions for I order differential equations. CO3:Able to solve linear equations with constant and variable coefficients. CO4:Form partial differential equations of some standard forms. CO5:Understand the application of linear differential equations.
22ST2SL1	Quantitative Aptitude and Data	CO1:Can interpret the data in picture format CO2: Understand Venn diagram and Casselet data.

	Interpretations	CO3:Able to compute Permutations and Combination. CO4:Understand the share value and brokerage. CO5:Able to find the present worth , bankers' discount and gain.