DEPARTMENT OF STATISTICS
PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE PROGRAMME (2023-2024)

NAME OF THE PROGRAMME: BACHELOR OF STATISTICS– PROGRAMME OUTCOME	
PO1	**Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study
PO2	**Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	**Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	**Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	**Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO7	**Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
PO8	**Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.

PO10	**Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	**Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO13	**Moral and ethical awareness/reasoning**: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demon starting the ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO14	**Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
PO15	**Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

NAME OF THE PROGRAMME: B.Sc STATISTICS – COURSE OUTCOMES	
SEMESTER I	
DESCRIPTIVE STATISTICS	1. Describe the scope, functions, applications and limitations of Statistics. 2. Also to explain the statistical survey, collection of data, sampling and presentation of data. 3. Discuss the importance and uses of central values and dispersions for the various types of data. 4. Also to measure the various measures of averages and scatteredness of the mass of data in a series. 5. Explain about the lack of symmetry ,rth moments and peakedness of the frequency distributions. 6. Ability to apply in data
PROBABILITY THEORY	1. Understand concepts of probability and identify the different approaches of probability Theory. 2. Define the random variable and its respective probability values and to compare a discrete and continuous random variable. 3. Calculate the expected value of a random variable variance, covariance, and moments and 4. Find the conditional expectation and variance of bi-variate random variable. 5. Estimate them erasures of central values, Dispersions, Skewness and Kurtosis through the generating function. 6. Understand bi-variate random variables and its distributions 7. Application of probability theory in real life
BIO - STATISTICS	1. Understand the concepts and statistical tools used in Biostatistics 2. Effectively apply these tools on solving the biological problems occur in real life 3. Analyze the given Bio-statistical data as per the objectives of the problem 4. Interpret the outcomes of the analyses meaningfully 5. Create research problems of his own and able to proceed with them
ELEMENTARY STATISTICS	1. Describe the rule that definition, relations and functions of set theory. 2. To develop the skill of computation with real sequences and series. 3. Students should be able to determine the number of out comes in a problem. 4. Students should be able to apply the fundamental principle of counting to find out the total number of outcomes in problem. 5. Understand of data and its relevance in business and develop an understanding of quantitative techniques. 6. Ability to apply in data.

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SEMESTER II	
MATRIX AND LINEAR ALGEBRA	1. Do basic operations of matrices 2. Understand various transactions of matrices and its applications 3. Understand various properties of matrices 4. Able to understand vector space and its applications 5. Able understand Eigen vector and its applications 6. Able understand vector and matrix applications
DISTRIBUTION THEORY	1. Identify discrete distributions appeared in real life situations 2. Understand some continuous distributions and its applications 3. Connection between some of the real values mathematical functions and its application in distribution theory. 4. Understand normal distribution and its properties. 5. Understand sampling distributions and its applications in real life. 6. Identify probability models in real data and estimate population parameters.
PRACTICAL - I	1. Develop the ability to compute and interpret measures of central tendency and dispersion for both discrete and continuous data using MS Excel. 2. Gain skills in visualizing data through histograms, frequency polygons, and ogives, enhancing data interpretation. 3. Acquire expertise in fitting and analyzing binomial, Poisson, and exponential distributions using Excel, along with solving univariate probability problems. 4. Learn to perform essential matrix operations, including calculating inverse, transpose, and rank matrices, using MS Excel.
BASIC COMPUTERS(MS EXCEL)	1. Enter and format data efficiently using Excel, including applying cell formatting, borders, colors, and font styles. 2. Utilize basic Excel functions such as SUM, AVERAGE, MAX, MIN, and COUNT to perform calculations on data sets. 3. Understand and apply Excel's data analysis tools such as sorting, filtering, and conditional formatting to organize and analyze data effectively 4. Create various types of charts and graphs in Excel, including bar charts, line graphs, pie charts, and scatter plots, to visualize data trends and relationships. 5. Perform advanced data analysis and modeling tasks using Excel's statistical functions and scenario analysis tools.

QUANTITATIVE APTITUDE	1. Understand the basic concepts of quantitative ability 2. Understand the basic concepts of logical reasoning Skills 3. Acquire satisfactory competency in use of reasoning 4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability. 5. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC,GPSC etc.
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SEMESTER III	
ESTIMATION THEORY	1. Estimate population parameters 2. Identify good estimators and its properties 3. Derive interval estimators of a parameter 4. Estimate parameters using various estimation methods and identify the best among the estimators 5. Handle data and can estimate population parameters 6. Realize the application of different types of estimators
SAMPLING TECHNIQUES	1. Know the difference between census and sampling. 2. Understand basic operations and advantages of sampling 3. Understand widely used sampling techniques 4. Know to estimate population information using sampling 5. Apply sampling techniques in real time problems 6. Identify suitable sampling technique for a real life survey
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SEMESTER IV	
TESTING OF STATISTICAL HYPOTHESIS	1. Frame hypotheses about population in real life research 2. Identify suitable testing procedure for given hypotheses 3. Compare two populations using samples taken from them 4. Compare populations in its means and variances separately 5. Identify situations to apply parametric and non parametric test 6. Interpret results of a hypothesis testing

ACTUARIAL STATISTICS	1. To explain the utility theory and insurance terminologies. 2. To particulate the insurance and annuity benefits through multiple life functions 3. Evaluation for special mortality laws. 4. To describe the various types of premium and their numerical evaluations. 5. To explain implementation of the Life insurance policies. 6. To describe Insurance payable at the moment of death and at the end of the year 7. of death-level benefit insurance. 8. To understand real life problems related to insurance
ECONOMIC & OFFICIAL STATISTICS	1. Understand Indian official statistics and offices related to it 2. Understand Indian surveys for collecting official statistics 3. Know uses of index numbers 4. Know demand analysis and its need **5.** To understand economic India by knowing agricultural and economic surveys. 6. To know the time series and prediction
NAME OF THE PROGRAMME: B.Sc STATISTICS – COURSE OUTCOMES	
SEMESTER V	
STOCHASTIC PROCESS	1. Understand Indian official statistics and offices related to it 2. Understand Indian surveys for collecting official statistics 3. Know uses of index numbers 4. Know demand analysis and its need **5.** To understand economic India by knowing agricultural and economic surveys. 6. To know the time series and prediction
REGRESSION ANALYSIS	1. Estimating model parameters and testing it. 2. Understand linear and non linear models assumptions . 3. Check model adequacy. 4. Know about variable selection . 5. Know about non linear regression models . 6. Choose model if some of the basic assumptions are violated also.

OPERATIONS RESEARCH	1. Understand optimization techniques and solving set of equations with constraints. 2. Solve problems of linear programming understand transportation problems and its applications . 3. Solve problems using games theory 4. Do replacement problems and solve it 5. Do network analysis and get problem solvingskills.
ECONOMETRICS / POPULATION STUDIES	1. Distinguish between proper and improper fractions. Express an algebraic fraction as the sum of its partial fractions. 2. Demonstrate the knowledge to determine the sums, expansion and approximation of seriesincluding binomial, exponential, logarithmic and fourier. 3. Solve problems about polynomials with real coefficients, imaginary and irrational roots. Explain the relationship between the derivative of a function as a function and the notion of the derivative. 4. Calculate limits of a function. 5. Obtain the n^{th} derivative in successive differentiation. Apply Euler'stheorem on homogenous function 6. Obtain the mathematical knowledge and skills for the better understandingof statistics as a mathematical science

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SEMESTER VI	
DESIGN OF EXPERIMENTS	1. To understand analysis of variance and experimental designs 2. Tohave strongtheoretical knowledge in Orthogonal latin squares, Hyper GraecoLatin squares 3. Know factorial and fractional factorial experiments, PIBD, inter and intrablocks, split plot, analysis co-variance 4. To understand clinical trial concepts and Response surface methodology 5. To do numerical problems andable to get critical thinking to solve problems 6. To choose suitable experiment and do it for real life problems
DEMOGRAPHY	1. Tounderstand need of population study and its registration system. 2. To understand fertilityand mortality effect on population 3. To understand life table and its usage to real problems 4. To get effect of migration in population 5. To understand population growth and its effect 6. To understand the need of population study for a government

PRACTICAL V	1. Understand the analysis of variance for comparing means across multiple groups to identify significant differences. 2. Learn to assess the interaction effects between two categorical independent variables on a dependent variable. 3. Gain skills in estimating missing observations in Least Significant Difference (LSD) designs, both for one and two missing values. 4. Use life tables and other models to predict and analyze fertility and mortality rates.
STATISTICAL QUALITY CONTROL	1. Understand industrial Applications of statistics 2. Understand statistical process control and methods for it 3. Understand attribute and variable control chart and interpret process based on it 4. Understand the situations using special purpose control Charts Know various product control techniques 5. To do Numerical Problems and able to get Critical thinking to Solve Problems to Explore Real Life Problems
TIME SERIES	1. Understand the time series concept 2. Estimate the trend values using various methods concept and purposes of index numbers 3. Understand the notation and formulae concerning the use. 4. Understand time series data its components and its application in various fields.
INDEX NUMBERS	1. Understand the time series concept 2. Estimate the trend values using various methods concept and purposes of index numbers 3. Understand the notation and formulae concerning the use. 4. Understand time series data its components and its application in various fields.
INTRODUCTION TO R LANGUAGE	1. Students will able to install, code and use basic R programming & Python 2. Describe key terminologies, concepts and techniques employed in statistical analysis Understand how to write simple coding 3. Compile and run the program 4. Interpret the result