Department of Mathematics

Program Outcomes

Understand the foundations of mathematics

PO1: Be able to perform basic computations in higher mathematics.

PO2: Be able to read and understand middle-level proofs.

PO3: Be able to write and understand basic proofs.

PO4: Develop and maintain problem-solving skills.

PO5: Use mathematical ideas to model real-world problems.

PO6: Be able to communicate mathematical ideas with others.

PO7: Have experience using technology to address mathematical ideas.

PO8: Students will effectively use professional level technology tools to support the study of mathematics and statistics.

PO9: Students will clearly communicate quantitative ideas both orally and in writing to a range of audiences.

PO10: Students will frame problems using multiple mathematical and statistical representations of relevant structures and relationships and solve using standard techniques.

B.SC. (Bachelor of Science)

Program outcomes

Bachelor of Science (BSc) offers theoretical as well as practical knowledge about different subject areas. These subject areas include Physics, Chemistry, Mathematics and Biology and other fields depending on the specialisation a student opts. This programme course is most beneficial for students who have a strong interest and background in Science and Mathematics. The course is also beneficial for students who wish to pursue multi and inter-disciplinary science careers in future.

Following are the various programme outcomes:

PO1: This course forms the basis of science and comprises of the subjects like physics, chemistry, biology, zoology and mathematics.

PO2: It helps to develop scientific temper and thus can prove to be more beneficial for the society as the scientific developments can make a nation or society to grow at a rapid pace.

PO3: After the completion of this course students have the option to go for higher studies i.e. M. Sc and then do some research for the welfare of mankind.

PO4: After higher studies students can join as scientist and can even look for professional job oriented courses.

PO5: This course also offers opportunities for serving in Indian Army, Indian Navy, Indian Air Force as officers.

PO6: Students after this course have the the option to join Indian Civil Services as IAS, IFS etc

B.SC.(Bachelor of Science)

Programme Specific Outcomes

PSO1. Demonstrate mastery of Computer Science in the following core knowledge areas

- Data Structures and Programming Languages
- Databases, Software Engineering and Development
- Computer Hardware and Architecture

PSO2. Apply problem-solving skills and the knowledge of computer science to solve real world problems.

PSO3. Develop technical project reports and present them orally among the users.

PSO4. Communicate computer science concepts, designs, and solutions effectively and professionally.

PSO5. Apply knowledge of computing to produce effective designs and solutions for specific problems.

PSO6. Use software development tools, software systems, and modern computing platforms.

B.Sc.(Bachelor of Science) I Year

Course Outcomes

Algebra and Trigonometry	CO1: Understand the transformation of matrix which is useful to find rank of matrix. CO2: Understand application of matrix to system of linear equation. CO3: They become able to solve theory of equations. CO4: Identify symbolic logic and Algebra of proposition. CO5: Realise importance of adjoint of a linear transformation and its canonical form.
Calculus	CO1: Assimilate the notions of limit of a sequence and convergence of a series of real numbers. CO2: Calculate the limit and examine the continuity of a function at a point. CO3: Understand the consequences of various mean value theorems for differentiable functions. CO4: Sketch curves in Cartesian and polar coordinate systems. CO5: Apply derivative tests in optimization problems appearing in social sciences, physical sciences, life sciences and a host of other disciplines.
Vector Analysis & Geometry	CO1: Understand how to analyze and synthesize given data to solve problems in geometry . CO2: Understand the basic ideas of conics. CO3: Enquire the basic knowledge of vector differentiation and vector integration. CO4: Students will realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.

B.Sc.(Bachelor of Science) II Year

Course Outcomes

Advanced calculus	CO1: Analyze the nature of sequence and series. CO2: Solve the applications on the mean value theorems. CO3: Evaluate the improper integrals using Beta and Gamma functions CO4: To have full knowledge of calculus involving the fundamental tools such as continuity and differentiability. CO5: Students are able to reason rigorously in mathematical arguments. They can follow abstract mathematical arguments and write their own proofs. CO6: Students are able to effectively communicate mathematics: reading, writing, listening, and speaking. Students make effective use of the library, conduct research and make oral and written presentations of their findings.
Differential Equation	CO1: Acquire the idea of Lagrange's method for solving the first order linear partial differential equations . CO2: Recognize the major classification of PDEs and the qualitative differences between the classes of equations. CO3: Be competent in solving linear PDEs using classical solution methods. CO4: Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients. CO5: Get an idea of power series method to solve differential equations Familiar with Legendre equation. CO6: Students will be able to know the use of Laplace transform in system modeling, digital signal processing, process control, solving Boundary Value Problems.

Mechanics	CO1: Familiarize with subject matter, which has been the single centre, to which were drawn mathematicians, physicists, astronomers, and engineers together. CO2: Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body. CO3: Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight. CO4: Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particles. CO5: Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.

B.Sc.(Bachelor of Science) III Year

Course Outcomes

Analysis	CO1: To learn basic techniques and examples in analysis to be well prepared for courses like Topology, Measure theory and Functional analysis. CO2: Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations. CO3: To equip students with basic mathematical tools such as open & close sets, continuity, connectedness, compactness which can be used to study general topology and real & complex analysis. CO4: To enhance abstract thinking and visualization of students. CO5: To generalize the notion of distance, convergent sequence and continuity of functions. CO6: To increase problem solving ability by solving examples and counter-examples of various concepts involved.
Abstract Algebra	CO1: Understand relation, partition of groups,, conjugacy classes, solvable group, finitely generated abelian group, rings, subring, integral domains etc. CO2: Effectively write abstract mathematical proofs in a clear and logical manner and apply the theory of abstract algebra to specific research problems in mathematics or other fields. CO3: Apply the knowledge of Algebra to attain a good mathematical maturity and enables to build mathematical thinking and skill. CO4: Gain an understanding to solve problems with the use of abstract algebra to diverse situations in mathematical contexts. CO5: Locate and use theorems to solve problems in number theory, use of ring theory to cryptography.
Discrete Mathematics	CO1: To understand logical concepts and to show logical equivalences by using truth tables and rules in logics. CO2: Demonstrate the ability to solve problems using counting techniques and combinatorics in the context of discrete probability. CO3: Solve problems involving recurrence relations and generating functions.

	CO4: Use graphs and trees as tools to visualize and simplify situations. CO5: understand the basic properties of formal languages and grammars. CO6: Make grammars to produce strings from a specific language.
Application of Mathematics in Finance and Insurance	CO1: This course intends to provide a basic understanding of the insurance mechanism. CO2: This course primarily deals with Practical aspects of Life insurance with the different aspects of life insurance, its different applications and its detailed features. CO3: It gives the reader an insight into the different types of life insurance plans & products, and its variations. CO4: The method of premium calculation and bonus, the different types of annuity plans, group insurance plans. CO5: To understand the concept of stock exchange and to calculate Dividend
Programming In C and Numerical Analysis	CO1: Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations. CO2: Apply various interpolation methods and finite difference concepts. CO3: Work out numerical differentiation and integration whenever and wherever routine methods are not applicable. CO4: Work numerically on the ordinary differential equations using different methods through the theory of finite differences. CO5: Apply Numerical analysis which has enormous application in the field of Science and some fields of Engineering. CO6: Familiar with calculation and interpretation of errors in numerical method..
Mathematical Modelling	CO1: Understand what a mathematical model is and explain the series of steps involved in a mathematical modelling process. CO2: State and explain the different classifications of mathematical models stating examples ineach classes explain the essential features of a good model and discuss the benefits of using a mathematical model. CO3: Identify some simple real-life problems that can be solved using mathematical models,model the problemS, solve the resulting problem, and interpret the solution.

	CO4: Mention and discuss some applications of mathematical modelling in solving problems in engineering, physical, biological, social and behavioral sciences. CO5: Acquire basic mathematical modelling skills that will enable them carry out simple modelling tasks individually or as a group.

BCA(Bachelor of Computer Applications)

Program Outcomes

PO1: Understand, analyze and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system.

PO2: Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.

PO3: Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

PO4: Effectively communicate busineness issues, management concepts, plans and decisions both in oral and written form using appropriate supportive technologies.

PO5: Develop various real time applications using latest technologies and programming languages.
Possess strong foundation for their higher studies.

PO6: Blend analytical, logical and managerial skills with the technical aspects to resolve real world issues.

PO7: Become employable in various IT companies and government jobs.

BCA(Bachelor of Computer Applications)

Programme Specific Outcomes

BCA programme has been designed to prepare graduates for attaining the following specific outcomes:

PSO1: focuses on preparing student for roles pertaining to computer applications and IT industry .

PSO2: start from the basics and in every semester learns each and everything about computers.

PSO3: develop programming skills, networking skills, learn applications, packages, programming languages and modern techniques of IT.

PSO4: get skill and info not only about computer and information technology but also in common, organization and management .

PSO5: Learn programming language such as Java, c++, HTML, SQL, etc.

PSO6: Information about various computer applications and latest development in IT and communication system is also provided

BCA(Bachelor of Computer Applications) I Year

Course Outcomes

Discrete Mathematics	CO1: Enhance his/her ability to reason and to present a coherent and mathematically accurate argument . CO2: Create sets verbally using appropriate mathematical terms (e.g., inclusive) and be able to write sets in roster form and set-builder notation. CO3: Identify how the shape of a graph of a function features properties of the function such as increasing, decreasing, even and odd. CO 4: Illustrate the properties of relations – reflexive, symmetric, transitive, and antisymmetric. CO5: Calculate the domain and range of a function from the algebraic form.

BCA(Bachelor of Computer Applications) II Year

Course Outcomes

Calculus and Differential Equations	CO1: Understand the concept of limits of a function (two and more variables). CO2: Calculate the limit and examine the continuity of a function at a point. CO3: Compare and contrast the ideas of continuity and differentiability. CO4: Develop the ability to apply differential equations to significant applied and/or theoretical problems. CO5: Investigate the qualitative behavior of solutions of systems of differential equations.

BCA(Bachelor of Computer Applications) III Year

Course Outcomes

Calculus and Geometry	CO1: Realize importance of bounded, convergent, Cauchy and monotonic sequences of real numbers. CO2: Learn about Riemann integrability of bounded functions and algebra of R-integrable functions. CO3: Determine various applications of the fundamental theorem of integral calculus. CO4: Understand how to analyze and synthesize given data to solve problems in geometry . CO5: Understand the basic ideas of conics.
Differential Equation and Fourier series	CO1: Think logically and mathematically and apply the knowledge of integral transform to solve complex problems. They will gain and idea that by applying the theory of Integral transform the problem from its original domain can be mapped into a new domain where solving problems becomes easier. CO2: Demonstrate understanding of basic concepts in application of partial differential equations in heat passing through rod, vibrating membrane, two dimensional heat conduction problems. CO3: TO represent periodic functions using Fourier series. CO4: Understand the need for a function or its approximation as an infinite series (Fourier Series) to represent discontinuous function which occurs in signal processing and electrical circuits. CO5: Demonstrate the use of Fourier Transform to connect the time domain and frequency domain. CO6: Enhance and develop the ability of using the language of mathematics in analyzing the real-world problems of sciences and engineering.

BCA(Bachelor of Computer Applications) I/II/III Year

Course Outcomes

Only For Non mathematics Students

Bridge course	CO1: Apply knowledge of discrete mathematics appropriate to the discipline. CO2: Analyze and solve problems based on Matrix & determinants . CO3: Understand Statistics and its applications and also will be able to calculate Mean, median and mode.

B.COM.(Bachelor of Commerce)

Program Outcomes

PO1: This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies, Transport Agencies, Warehousing etc., well trained professionals to meet the requirements.

PO2: After completing graduation, students can get skills regarding various aspects like Marketing Manager, Selling Manager, over all Administration abilities of the Company.

PO3: Capability of the students to make decisions at personal & professional level will increase after completion of this course.

PO4: Students can independently start up their own Business.

PO5: Students can get thorough knowledge of finance and commerce.

PO6: The knowledge of different specializations in Accounting, costing, banking and finance with the practical exposure helps the students to stand in organization.

B.COM.(Bachelor of Commerce)

Programme Specific Outcomes

PSO1: The students can get the knowledge, skills and attitudes during the end of the B.com degree course.

PSO2: By goodness of the preparation they can turn into a Manager, Accountant , Management Accountant, cost Accountant, Bank Manager, Auditor, Company Secretary, Teacher, Professor, Stock Agents, Government employments and so on.

PSO3: Students will prove themselves in different professional exams like C.A. , C S, CMA, MPSC, UPSC. As well as other coerces.

PSO4: The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in day to day business activities.

PSO5: Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer.

PSO6: Students can also get the practical skills to work as accountant, audit, assistant, tax consultant, and computer operator As well as other financial supporting services.

PSO7: Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.

PSO8: Students will be able to do their higher education and can make research in the field of finance and commerce.

B.COM.(Bachelor of Commerce) I Year

Course Outcomes

Business Mathematics	CO1. Define basic terms in the areas of business calculus and financial mathematics. CO2. Explain basic methods of business calculus, types and methods of interest account and their basic applications in practice. CO3. Solve problems in the areas of business calculus, simple and compound interest account, use of compound interest account, loan and consumer credit. CO4. Discern effects of various types and methods of interest account. CO5. Connect acquired knowledge and skills with practical problems in economic practice.

B.COM.(Bachelor of Commerce) II Year

Course Outcomes

Business Statistics	CO1: To understand the meaning and importance of correlation and regression analysis including both simple and multiple correlation and regression. CO2: Describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis. CO3: Understand and critically discuss the issues surrounding sampling and significance. CO4: Discuss critically the uses and limitations of statistical analysis. CO5: Solve a range of problems using the techniques covered. CO6: Conduct basic statistical analysis of data.

BBA(Bachelor of Business Administration)

Program Outcomes

PO1: To provide adequate basic understanding about Management Education among the students.

PO2: To prepare students to exploit opportunities being newly created in the Management Profession.

PO3: To develop appropriate skills in the students so as to make them competent and provide themselves self-employment.

PO4: To work well in teams, including virtual settings.

PO5: To understand finance and other core business content.

PO6: To recognize and solve business problems in an ethical manner.

PO7: To communicate business information professionally.

PO8: To build the department as a centre of excellence for imparting high quality management education at the undergraduate level.

PO9: To stimulate in students an interest in research and initiate them into research methodologies.

PO10: To foster thinking minds that are sensitive to societal needs and issues thus making them good human beings and responsible members of the society.

PO11: To provide an environment that facilitates all-round development of the student personality

BBA(Bachelor of Business Administration)

Programme Specific Outcomes

PSO1:Outcome Enables students to apply knowledge of management theories and practices to solve business problems.

PSO2:Encourages analytical and critical thinking abilities for business decision making. Promotes ethical and value-based leadership ability.

PSO3:Provides a wide knowledge of all disciplines of the course and training in management of both animate and inanimate entities and develops leadership skills.

PSO4:Enables students to effectively communicate business issues, management concepts, plans and decisions both in oral and written form using appropriate supportive technologies.

PSO5:Equips students to demonstrate the capabilities required to apply cross-functional business knowledge and technologies in solving real-world business problems.

PSO6:Enables students to demonstrate use of appropriate techniques to effectively manage business challenges. Makes students capable of recognizing and resolving ethical issues.

PSO7: Helps to prepare students for managerial roles and as entrepreneurs.

BBA(Bachelor of Business Administration) I Semester

Course Outcomes

Business Mathematics	CO1. Define basic terms in the areas of business calculus and financial mathematics. CO2. Explain basic methods of business calculus, types and methods of interest account and their basic applications in practice. CO3. Solve problems in the areas of business calculus, simple and compound interest account, use of compound interest account, loan and consumer credit. CO4. Discern effects of various types and methods of interest account. CO5. Connect acquired knowledge and skills with practical problems in economic practice.

BBA(Bachelor of Business Administration) II Semester

Course Outcomes

Business Statistics	CO1: Describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis. CO2: Critically evaluate the underlying assumptions of analysis tools. CO3: Understand and critically discuss the issues surrounding sampling and significance. CO4: Discuss critically the uses and limitations of statistical analysis. CO5: Solve a range of problems using the techniques covered CO6. Conduct basic statistical analysis of data.

M.Sc. (Master of Science)-Mathematics

Program Outcomes

PO1: Equip the student with skills to analyze problems, formulate an hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.

PO2: Prepare students for pursuing research or careers in industry in mathematical sciences and allied fields.

PO3: Imbibe effective scientific and/or technical communication in both oral and writing.

PO4: Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical sciences.

PO5: Create awareness to become an enlightened citizen with commitment to deliver one's responsibilities within the scope of bestowed rights and privileges.

M.Sc. (Master of Science)-Mathematics

Programme Specific Outcomes

Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.

PSO1: Inculcate mathematical reasoning.

PSO2: To develop ones own learning capacity.

PSO3: Prepare and motivate students for research studies in mathematics and related fields.

PSO4: Develop abstract mathematical thinking.

PSO5: Assimilate complex mathematical ideas and arguments.

M.Sc.(Master of Science)-Mathematics ISemester

Course Outcomes

Advanced Abstract Algebra(I)	CO1: Apply the knowledge of Algebra to attain a good mathematical maturity and enables to build mathematical thinking and skill. CO2: Design, analyze and implement the concepts of homomorphism and isomorphism between groups and rings for solving different types of problems, for example, Isomorphism theorems, quotient groups, conjugacy etc. CO3: Facility in solving real life problems by thinking logically and outside of box. CO4: Create, select and apply appropriate algebraic structures such as Galois extensions, Automorphisms of groups and fixed fields, Fundamental theorem of Galois theory to understand and use the Fundamental theorem of Algebra. CO5: Identify the challenging problems in advanced Algebra to pursue further research.
Real Analysis(I)	CO1: Apply the knowledge of concepts of real analysis in order to study theoretical development of different mathematical techniques and their applications. CO2: Identify challenging problems in real variable theory and find their appropriate solutions. CO3: Use theory of Riemann-Stieltjes integral in solving definite integrals arising in different fields of science and engineering. CO4: Deal with axiomatic structure of metric spaces and generalize the concepts of sequences and series, and continuous functions in metric spaces. CO5: Extend their knowledge of real variable theory for further exploration of the subject for going into research.

Topology	CO1: Understand the concepts of topological spaces and the basic definitions of open sets, neighbourhood, interior, exterior, closure and their axioms for defining topological space. CO2: Understand the concept of Bases and Subbases, create new topological spaces by using subspace. CO3: Understand continuity, compactness, connectedness, homeomorphism and topological properties. CO4: Understand how points of space are separated by open sets, Housdroff spaces and their importance. CO5: Understand regular and normal spaces and some important theorems in these spaces.
Advanced Complex Analysis(I)	CO1: Know the fundamental concepts of complex analysis. CO2: Evaluate complex integrals and apply Cauchy integral theorem and formula. CO3: Constructing Mobius transformations mapping given circles to given circles. CO4: Evaluate limits and checking the continuity of complex function & apply the concept of analyticity and the Cauchy-Riemann equations. CO5: Solve the problems using complex analysis techniques applied to different situations in engineering and other mathematical contexts. CO6: Extend their knowledge to pursue research in this field.
Advanced Discrete Mathematics(I)	CO1: Construct mathematical arguments using logical connectives and quantifiers. CO2: learn how to work with some of the discrete structures which include sets, relations, functions, graphs and recurrence relation. CO3: Understand the basic properties of formal languages and grammars. CO4: Make grammars to produce strings from a specific language. CO5: Efficiency in solving concrete combinatorial problems whose presence is ubiquitous in science and engineering.

M.Sc.(Master of Science)- Mathematics II Semester

Course Outcomes

Advanced Abstract Algebra(II)	CO1: Apply the knowledge of Algebra to attain a good mathematical maturity and enables to build mathematical thinking and skill. CO2: Ability to deal with module theory which is indispensable in wide ranges of mathematical disciplines such as algebra, topology, number theory, operator theory etc. CO3: Facility in solving real life problems by thinking logically and outside of box. CO4: Identify the challenging problems in advanced Algebra to pursue further research.
Real Analysis(II)	CO1: Apply the knowledge of concepts of real analysis in order to study theoretical development of different mathematical techniques and their applications. CO2: Understand how Lebesgue measure on R is defined, CO3: Understand basic properties are measurable functions, CO4: Understand how measures may be used to construct integrals, CO5: Know the basic convergence theorems for the Lebesgue integral, CO6: Understand the relation between differentiation and Lebesgue integration. CO7: Extend their knowledge of Lebesgue theory of integration by selecting and applying its tools for further research in this and other related areas.
General and Algebraic Topology	CO1: Ability to differentiate between some more topological spaces. CO2: Using algebraic methods to solve topological problems. CO3:Using topological methods to solve algebraic problems. CO4: Understand regular and normal spaces and some important theorems in these spaces.

Advanced Complex Analysis(II)	CO1: Constructing Mobius transformations mapping given circles to given circles. CO2: Evaluation of indefinite real integrals using complex analysis. CO3: Solve the problems using complex analysis techniques applied to different situations in engineering and other mathematical contexts. CO4: Understanding of topological and geometric properties of the complex plane. CO5: Establish the capacity for mathematical reasoning through analysing, proving and explaining concepts from complex analysis.
Advanced Discrete Mathematics(II)	CO1: Use graphs and trees as tools to visualize and simplify situations. CO2: Efficiency in solving concrete combinatorial problems whose presence is ubiquitous in science and engineering. CO3: Understand the definitions namely, cut vertex, bridge, blocks and Automorphism group of a graph. CO5: Study the properties of trees and connectivity. CO5: Idetify Eulerian graphs and apply results to identify Hamiltonian graphs. CO6: Understand the concepts Planarity including Euler identity.

M.Sc.(Master of Science)-MathematicsIII Semester

Course Outcomes

Integration Theory and Functional Analysis(I)	CO1: Explain the fundamental concepts of functional analysis and their role in modern mathematics. CO2: Utilize the concepts of functional analysis, for example continuous and bounded operators, normed spaces, Hilbert spaces and to study the behavior of different mathematical expressions arising in science and engineering. CO3: Understand and apply fundamental theorems from the theory of normed and Banach spaces including the Hahn-Banach theorem, the open mapping theorem, the closed graph theorem and uniform boundedness theorem. CO4: Explain the concept of projection on Hilbert and Banach spaces.
Partial Differential Equation & Mechanics(I)	CO1: Classify the fundamental principals of partial differential equations(PDEs) to solve hyperbolic, parabolic and elliptic equations. CO2: Formulate appropriate numerical methods for solving various problems in partial differential equations. CO3: Adapt mathematical software to solve various problems in partial differential equations.
General Relativity and Cosmology(I)	CO1: You will be able to define the principles and equations that are the foundation of models of the universe in the general theory of relativity. CO2: You will be able to explain important cosmological observations and how they are used to determine the characteristics of the Universe. CO3: You will know how to describe, qualitatively and quantitatively, important eras in the history of the universe: inflationary phase, radiation dominated phase with disengagement of dark matter and neutrinos, nucleosynthesis, matter dominated universe, recombination and the formation of cosmic microwave background radiation. CO4: You can describe how quantum fluctuations during inflation are the source of density fluctuations and gravitational waves.
Fuzzy Set Theory & Its Applications(I)	CO1: Discuss types of operations on fuzzy sets, t-norms, fuzzy arithmetic. CO2: Explain extension principle of fuzzy sets, fuzzy numbers.

	CO3: Illustrate fuzzy relations, binary fuzzy relations, fuzzy equivalence relations. CO3: State some applications of fuzzy sets.
Mathematical Biology (I)	CO1: Formulate discrete and differential equation models that represent a range of biological problems, including identifying assumptions that are appropriate for the problem to be solved. CO2: Choose and apply computational tools to perform parameter estimation and to solve discrete and differential equation models. CO3:Interpret model and data output in terms of the original biological problem, and use results to direct a follow-up experiment. CO4: Perform appropriate data manipulations, and graphically display model output and data clearly and accurately. CO5: Effectively communicate across the disciplines. CO6: Demonstrate appropriate laboratory technique, design an experiment, and collect data.
Operations Research(I)	CO1: Continue to acquire knowledge and skills of optimization techniques that are appropriate to professional activities CO2: Extend their knowledge of basic optimization techniques to do interesting research work on these types of optimization techniques. CO3: Analyze Graphical Method, Use of Artificial variables and Inverting a Matrix using Simplex method. CO4: Apply Duality to solve problems in Linear Programming. CO5: Understand Test the optimality for Degeneracy by using Transportation Algorithms (MODI method). CO6: Study Assignment Problem and its applications.
Wavelets(I)	CO1: Understand the properties of various scaling functions and their wavelets. CO2: Understand the properties of multiresolution analysis. CO 3: Construct the scaling functions using infinite product formula and iterative procedure. CO 4: Implement wavelets in various problems like image compression, denoising etc.

Graph Theory(I)	CO1. To understand and apply the fundamental concepts in graph theory. CO2. Students will learn core ideas in graph theory. CO3. Students will understand the language of graphs and trees. CO4. Students will understand the use of graphs as models. CO5. Students will understand various types of trees and methods for traversing trees. CO6: Study the properties of trees and connectivity. CO7: Idetify Eulerian graphs and apply results to identify Hamiltonian graphs.
Algebraic Number Theory(I)	CO1: Prove results involving divisibility and greatest common divisors . CO2: Solve systems of linear congruences. CO3: Find integral solutions to specified linear Diophantine Equations. CO4: Apply Euler-Fermat's Theorem to prove relations involving prime numbers. CO5: Apply the Wilson's theorem.

M.Sc.(Master of Science)-MathematicsIVSemester

Course Outcomes

Functional Analysis(II)	CO1: Working with a complete orthogonal set a.k.a. Schauder basis in a Hilbert space. CO2: The student has knowledge of central concepts from functional analysis, including the Hahn-Banach theorem, the open mapping and closed graph theorems, the Banach-Steinhaus theorem, dual spaces, weak convergence, the Banach-Alaoglu theorem, and the spectral theorem for compact self-adjoint operators. CO3: After completing this course, the student gets introduced to the basics that are required for analysis of continuous linear functions on Banach space. The student also learns the famous Hahn-Banach, Open mapping, Closed Graph theorem and Uniform boundedness principles.
Partial Differential Equation & Mechanics(II)	CO1: Classify the fundamental principals of partial differential equations(PDEs) to solve hyperbolic, parabolic and elliptic equations. CO2: Formulate appropriate numerical methods for solving various problems in partial differential equations. CO3: Adapt mathematical software to solve various problems in partial differential equations.
Cosmology(II)	CO1: You will be able to define the principles and equations that are the foundation of models of the universe in the general theory of relativity. CO2: You will be able to explain important cosmological observations and how they are used to determine the characteristics of the Universe. CO3: You will know how to describe, qualitatively and quantitatively, important eras in the history of the universe: inflationary phase, radiation dominated phase with disengagement of dark matter and neutrinos, nucleosynthesis, matter dominated universe, recombination and the formation of cosmic microwave background radiation. CO4: You can describe how quantum fluctuations during inflation are the source of density fluctuations and gravitational waves.

Fuzzy Set Theory & Its Applications(II)	CO1: Discuss types of operations on fuzzy sets, t-norms, fuzzy arithmetic. CO2: Explain extension principle of fuzzy sets, fuzzy numbers. CO3: Illustrate fuzzy relations, binary fuzzy relations, fuzzy equivalence relations. CO4: State some applications of fuzzy sets.
Mathematical Biology (II)	CO1: Formulate discrete and differential equation models that represent a range of biological problems, including identifying assumptions that are appropriate for the problem to be solved. CO2: Choose and apply computational tools to perform parameter estimation and to solve discrete and differential equation models. CO3:Interpret model and data output in terms of the original biological problem, and use results to direct a follow-up experiment. CO4: Perform appropriate data manipulations, and graphically display model output and data clearly and accurately. CO5: Effectively communicate across the disciplines. CO6: Demonstrate appropriate laboratory technique, design an experiment, and collect data.
Operations Research(II)	CO1: Apply the knowledge of advanced optimization techniques in order to get best possible results from a set of several possible solutions of a given problem. CO2: Study GAME Theory and its applications. CO2: Formulate an optimization problem from its physical consideration. CO3: Select and implement an appropriate optimization technique keeping in mind its limitations in order to solve a particular optimization problem. CO4: Extend their knowledge of advanced optimization techniques in order to do interesting research work on these and similar types of optimization techniques.
Wavelets(II)	CO1: Understand the properties of various scaling functions and their wavelets. CO2: Understand the properties of multiresolution analysis. CO 3: Construct the scaling functions using infinite product formula and iterative procedure. CO 4: Implement wavelets in various problems like image compression, denoising etc.

Graph Theory(II)	CO1. To understand and apply the fundamental concepts in graph theory. CO2. To apply graph theory based tools in solving practical problem. CO 3. Students will learn core ideas in graph theory. CO4. Students will understand the language of graphs and trees. CO 5. Students will understand the use of graphs as models. CO6. Students will understand various types of trees and methods for traversing trees.
Algebraic Number Theory(II)	CO1: Prove results involving divisibility and greatest common divisors . CO2: Solve systems of linear congruences. CO3: Find integral solutions to specified linear Diophantine Equations. CO4: Apply Euler-Fermat's Theorem to prove relations involving prime numbers. CO5: Apply the Wilson's theorem.

M.SC.(Master of Science)Computer Science

Program Outcomes

PO-1: Provides technology-oriented students with the knowledge and ability to develop.

PO-2: creative solutions. Develop skills to learn new technology.

PO-3: Apply computer science theory and software development concepts to construct computing-based solutions.

PO-4: Design and develop computer programs/computer-based systems in the areas related to algorithms, networking.

PO-5: Ability to learn and use new development tools, software framework, middleware, programming language or methodology to aid in the development of software projects.

PO-6: Ability to define, assess and adhere to software quality practices, and software processes and methodologies.

PO-7: Ability to be an effective member of a multi-disciplinary software project development team with an awareness of individual, professional and ethical responsibilities.

M.SC.(Master of Science)Computer Science

Programme Specific Outcomes

PSO1:An ability to use current techniques, skills and tools for programming practically.

PSO2:Capability of the students to apply design and development principles in the construction of software systems.

PSO3:Student can develop minor projects and major projects.

PSO4:Enabling the student's practical exposure in the software development field.

PSO5:Entrusting student interests in building their career in the field of IT by providing latest technologies like IoT, Cloud computing, Robotics and so on.

M.SC.(Master of Science)Computer Science I Semester

Course Outcomes

Mathematical Foundation of Computer Science	CO1: Ability to apply mathematical logic to solve problems. CO2: Understand sets, relations, functions, and discrete structures. CO3: Able to use logical notation to define and reason about fundamental mathematical nconcepts such as sets, relations, and functions. CO4: Able to formulate problems and solve recurrence relations. CO5: Able to model and solve real-world problems using graphs and trees.

M.SC.(Master of Science)Computer Science II Semester

Course Outcomes

Numerical Analysis	CO1: Understand the theoretical and practical aspects of the use of numerical analysis. CO2: Proficient in implementing numerical methods for a variety of multidisciplinary applications. CO3: Establish the limitations, advantages, and disadvantages of numerical analysis. CO4: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. CO5: Understand of common numerical analysis and how they are used to obtain approximate solutions to otherwise intractable mathematical problems.

M.COM.(Master of Commerce)

Program Outcomes

PO1: To provide a systematic and rigorous learning and exposure to Banking and Finance related disciplines.

PO2: To train the student to develop conceptual, applied and research skills as well as competencies required for effective problem solving and right decision making in routine and special activities relevant to financial management and Banking Transactions of a business.

PO3: To acquaint a student with conventional as well as contemporary areas in the discipline of Commerce.

PO4: To enable a student well versed in national as well as international trends.

PO5: To facilitate the students for conducting business, accounting and auditing practices, role of regulatory bodies in corporate and financial sectors nature of various financial instruments.

PO6: To provide in-depth understanding of all core areas specifically Advanced Accounting, International Accounting, Management, Security Market Operations and Business Environment, Research Methodology and Tax planning.

M.COM.(Master of Commerce)

Programme Specific Outcomes

After Completing Masters in Commerce students are able to

PSO1: Develop an ability to apply knowledge acquired in problem solving.

PSO2: Ability to work in teams with enhanced interpersonal skills and communication.

PSO3: The students can work in different domains like Accounting, Taxation, HRM, Banking and Administration.

PSO4: Ability to start their own business.

PSO5: Ability to work in MNCs as well as pvt, and public companies.

PSO6: To develop team work, leadership and managerial and administrative skills.

PSO7: Students can go further for professional courses like CA/ CS/CMA/CFA•

M.COM.(Master of Commerce) I Semester

Course Outcomes

Statistical Analysis	CO1: To develop an understanding of the theory of probability, rules of probability and probability distributions. CO2: To comprehend the decision making process under uncertainty using statistical tools. CO3: To become aware of the concepts in sampling, sampling distributions and estimation. CO4: To understand the meaning and process of hypothesis testing including one-sample and two-sample tests. CO5: To appreciate the importance and application of non-parametric tests in hypothesis testing. CO6: To understand the meaning and importance of correlation and regression analysis including both simple and multiple correlation and regression.

M.COM.(Master of Commerce) II Semester

Course Outcomes

Advance Statistics	CO1: : The basic concepts of statistics and its use in business. CO2: Demonstrate the ability to apply linear, nonlinear and generalized linear models. CO3: Demonstrate knowledge of probability and the standard statistical distributions. CO4: Demonstrate understanding of how to design experiments and surveys for efficiency. CO5: More observations and understand relation between them. CO6 Demonstrate the ability to perform complex data management and analysis.