Department of Mathematics

B.Sc. Mathematics

S.No.	Course Code	Course Name	Course Outcomes
		SEMESTER - I	
1.	18UMAC11	Core Course – I: Foundation Course – Basic Mathematics	1. Calculate derivatives of functions defined implicitly. 2. Calculate a definite integral as a limit of approximating sums. 3. Develop skill in two dimensional spaces. 4. Able to find the distance between two points. 5. Able to find the centroid, incentre of the triangle. 6. Know basic concepts of Sets, Functions and Relations.
2.	18UMAC12	Core Course – II: Calculus and its Applications	1. Understand the concept of differentiation. 2. Find the higher derivatives. 3. Gain an in-depth knowledge of partial differentiation using Euler's theorem. 4. Find critical points, and use them to locate maxima and minima. 5. Use the derivative to find tangent lines to curves. 6. Equip with the basic knowledge of integration. 7. Learn about the beta and gamma functions and its properties.
3.	18UMAN11	Non - Major Elective Course - I: Fundamentals of Mathematics	1. Able to find LCM and HCF of numbers. 2. Able to solve applications involving permutations and

			combinations. 3. Use sets and/or Venn diagrams to solve a stated problem. 4. Learn the differentiation rules for products, quotients and the chain rule. 5. Find critical points, and use them to locate maxima and minima.
4.	18UMAE1P	Enrichment Course - I: PC Software Lab	1. Give the basic knowledge on MS word. 2. Design the creation of newspaper format with header & footer. 3. Learn how to do Mail Merge practically. 4. Provide the ability to understand Excel functions. 5. Learn the better skills to effectively use Power point for presentation
5.	18UPHA11/18UCHA11	Allied Course – I: Mathematics – I	1. Impart knowledge in basic mathematical statistics. 2. Inculcate the basic knowledge of measures of dispersion like mean, median and mode. 3. Know about the concept of correlation, regression and index numbers. 4. Gain an in-sight knowledge in the various aspects of fitting curves. 5. Understand and identify the need of using Operations Research. 6. Gain knowledge of linear programming technique using

			graphical solution method. 7. Gain knowledge of transportation problem and assignment problem.
6.	18UCSA11/18UITA11/18UCAA11	Allied Course – I: Mathematical Foundations	1. Understand the mathematical laws of logic and connectives. 2. Gain knowledge of different types of sets such as, finite and infinite sets, empty set, singleton set, equivalent sets, equal sets, sub sets. 3. Determine whether a function is one-one, onto or into. 4. Use row operations to determine whether a square matrix is invertible. 5. Learn a mathematical graph to represent real life situation. 6. Demonstrate the basic definitions, computer representations and properties of a graph.
SEMESTER – II			
7.	18UMAC21	Core Course – III: Classical Algebra	1. Understand the basic knowledge of numbers and its types. 2. Introduce the notion of Euler's function. 3. Get in insight into divisibility using Fermat's Theorem and generalized Fermat's Theorem. 4. Learn about the characterization of prime numbers using Wilson's theorem. 5. Learn the concept of rational roots, irrational roots , imaginary roots and the relation between the roots and coefficient of the equations. 6. Gain knowledge of removal of terms using theorems like

			Rolle's theorem and strum's theorem. 7. Find the roots of biquadratic and cubic equations by using Cardon's method.
8.	18UMAC22	Core Course – IV: Analytical Geometry – 3D	1. Define and represent geometrical shapes in a numerical way and extracting numerical information from shapes' numerical definitions and representations. 2. Enable the students to develop their skill in 3 dimensional Cartesian Co-ordinates system. 3. Learn the properties of straight lines and spheres. 4. Derive the conditions for parallelism and perpendicularity of two lines.
9.	18UMAN21	Non - Major Elective Course - II : Statistical Methods	1. Enable the students to understand the meaning, definition, nature, importance and limitations of statistics. 2. Able to create, read, and interpret graphs, charts, histograms, and diagrams. 3. Explain the relevance and use of statistical tools for analysis and forecasting. 4. Understand and use the basic measure of central tendency. 5. Know about the concept of Index numbers.
10.	18UMAE21	Enrichment Course – II: Astronomy	Achieve a good understanding of physical laws and principles. 2. Appreciate the wide variety of objects contained in the universe. 3. Understand the relative sizes of the planets within the solar system.

			4. Use Mathematics to perform calculations on earth and / or space science problems. 5. Make observations regarding the earth or space and infer conclusions from them. 6. Describe and explain the observed daily and long-term motion of objects (sun, moon, planets and stars).
11.	18UPHA21/18UCHA21	Allied Course – II: Mathematics – II	1. Develop an analytic thinking in the concept of transformation of equations. 2. Demonstrate reciprocal equations. 3. Understand the concept of differentiation. 4. Introduction about the higher derivatives. 5. Endow with an in-depth knowledge of partial differentiation using Euler's theorem. 6. Equip with the basic knowledge of integration. 7. Develop the skill of solving differential equations.
12.	18UCSA21/18UITA21/18UCAA21	Allied Course - II: Operations Research	1. Present the history, nature and scope of operations research. 2. Demonstrate the main characteristics of operations research. 3. Inculcate the insight knowledge of linear programming problem. 4. Evaluate the solution of linear programming problem using graphical method. 5. Understand the computational procedure of simplex method. 6. Study the computational procedure of transportation problem.

SEMESTER – III			
13.	18UMAC31	Core Course – V: Sequences and Series	1. Provide a formal introduction to the concept of limit and compute the limits of sequences. 2. Gain knowledge of some simple techniques for testing the convergence of sequences. 3. Apply the properties of limits summarized in theorems and recognize when a sequence is increasing, decreasing, bounded and monotonic. 4. Relate the convergence or divergence of the series using the sequence of partial sums. 5. Study about the integral test which shows the equivalence between the convergence of a series and that of an associated integral. 6. Know about the alternating series and its properties. 7. Gain knowledge for testing the convergence of series of positive terms
14.	18UMAC32	Core Course – VI: Numerical Methods	1. Give procedures for solving numerically different kinds of problems occurring in engineering and technology. 2. Develop skills in solving problems using numerical techniques. 3. Gain an in-depth knowledge of the various aspects of curve fitting of curves. 4. Find solution of system of linear equations, roots of non-

			linear equations. 5. Use the numerical techniques to solve algebraic and differential equations. 6. Able to approximate the functions and to estimate the errors. 7. Learn the concept of interpolation.
15.	18UMAA31	Allied Course – III: Programming in C and C++	1. Gaining experience about structured programming. 2. Helping students to understand the implementation of C and C++ language. 3. Letting the students to know the power of Modular Programming through Functions. 4. Understanding how C++ improves C with object-oriented features. 5. Learning the syntax and semantics of the C++ programming language. 6. Learning how to implement copy constructors and class member functions and Inheritance
16.	18UMAA3P	Allied Course – III : Programming in C and C++ Lab	1. Letting the students to learn C programming language through practical experience. 2. Understanding how to implement Programs with and arrays and string Improving problem solving skills using C++. 3. Understanding the difference between C structures and C++ classes. 4. Enabling the students to effectively use Constructors and Destructors.

			5. Implementing programs to obtain Overloading concept and various Inheritance techniques.
17.	18UMAS31	Skilled Based Course – I: Trigonometry	1. Learn about the hyperbolic functions. 2. Evaluate inverse trigonometric functions. 3. Apply logarithms to the solution of problems encountered in mathematics and the sciences. 4. Familiarize themselves with basic properties of sine, cosine and tangent functions. 5. Apply trigonometric techniques as tools in the analysis of mathematical, physical, and scientific problems.
18.	18UMAV31	Value Based Course – I: Data Interpretation	1. Able to independently read mathematical and statistical literature of various types, including survey articles, scholarly books, and online sources. 2. Communicate statistical ideas clearly in both oral and written form using appropriate statistical terminology. 3. Generate reports that show statistical expertise in writing and model implementation. 4. Methods to summarize a collection of data by describing what was observed using number of graphs. 5. Ability to deal with the collection, organization, presentation, computation and interpretation of data.
19.	18UCSA31	Allied Course – III: Numerical Methods and its Applications	1. Introduce the learners the methods of solving equations. 2. Enable students to use numerical techniques to tackle problems that are not analytically solvable.

			3. Inculcate the basic knowledge of algebraic and transcendental equations. 4. Find the solutions of simultaneous linear equations using Gauss elimination, GaussJordan and Gauss Seidel methods. 5. Introduce the concept of Interpolation which will be used to predict the data. 6. Use various techniques like trapezoidal rule, simpson's rule and weddle's rule in solving numerical integration problems. 7. Learn about the solution of differential equations using different techniques like Taylor's series method and Runge Kutta method.
SEMESTER – IV			
20.	18UMAC41	Core Course – VII: Mechanics	1. Able to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium. 2. Understand the analysis of distributed loads. 3. Able to calculate centroid and moments of inertia. 4. Gain knowledge of kinetic energy and momentum methods for particles and systems of particles. 5. Acquire knowledge of the general principles of dynamics.
21.	18UMAC42	Core Course – VIII: Differential Equations and its Applications	1. Understand some basic definitions and terminology associated with differential equations and their solutions. 2. Use analytical methods of solution: by direct integration;

			separation of variables; and the integrating factor method. 3. Determine solutions to first order exact differential equations. 4. Convert separable and homogeneous equations to exact differential equations by integrating factors. 5. Determine solutions to second order linear homogeneous differential equations with constant coefficients. 6. Determine solutions of partial differential equations of the first order. 7. Learn applications of first order equations and linear equations with constant coefficients.
22.	18UMAA41	Allied Course – IV : Multimedia and its Applications	1. Understanding Multimedia and its elements. 2. Providing knowledge on Text,Audio and Video. 3. Making students to analyze image its formats. 4. Learning how moving and stable images work. 5. Introducing various techniques to Animation.
23.	18UMAA4P	Allied Course – IV: Multimedia Lab	1. Understanding the package Adobe Photoshop. 2. Designing different shapes and allowing students to improve their designing skill. 3. Providing knowledge on moving pictures and stable pictures. 4. Making students to create interesting edited images.
24.	18UMAO41	Major Elective Course – I: Vector Calculus	1. Gain knowledge about the dot product of vectors, lengths of vectors, and angles between vectors. 2. Evaluate the velocity and acceleration of a particle moving

			along a space curve. 3. Evaluate line integrals of scalar functions or vector fields along curves. 4. Evaluate surface integrals. 5. Apply the divergence theorem to give a physical interpretation of the divergence of a vector field.
25.	18UMAO42	Major Elective Course – I: Consumer Affairs	1. The learners know about the need for consumer protection and the areas covered by consumer protection law 2. Learners will have a clear idea on legislative controls on unconscionable conduct, misleading or deceptive conduct, false or misleading representations and other unfair practices 3. The learners know the legal obligations of a supplier of goods or services 4. The learners know the obligations of manufacturers and the rights of consumers to compensation 5. The learners know the bodies available to protect the rights of the consumer and discuss their operations.
26.	18UMAO43	Major Elective Course - I: Discrete Mathematics	1. Make a good background on coding theory. 2. Enhance the idea of decoding. 3. Demonstrate the Logics and its properties. 4. Get insight knowledge of Tautology and Tautological Implications. 5. An ability to identify the replacement process. 6. Give a strong foundation on Automata language.

			7. Gain knowledge for Non - Deterministic Finite Automata.
27.	18UCSA41	Allied Course - IV: Numerical Ability	1. Able to apply quantitative reasoning and mathematical analysis methodologies to solve problems. 2. Determine the square roots, cube roots of positive whole numbers, decimals and common fractions. 3. Able to perform operations with surds and indices. 4. Understanding the properties of proportion and its usage. 5. Examine how to calculate Simple and Compound interest. 6. Able to demonstrate an understanding of the difference between area and perimeter.
SEMESTER – V			
28.	18UMAC51	Core Course –IX: Modern Algebra	1. Ability to demonstrate the importance of algebraic properties with regard to working with in various number systems. 2. Understand the relationships between abstract algebraic structures with familiar number systems such as the integers and real numbers. 3. Effectively write abstract mathematical proofs in a clear and logical manner. 4. Demonstrate ability to think critically by interpreting theorems and relating results to problems in other mathematical disciplines. 5. Gain Knowledge about the fundamental concepts such as

			groups and rings. 6. Apply the theorems, proof techniques and standard computations of group and ring theory to solve problems. 7. Gain knowledge about different types of subgroups such as normal subgroups and cyclic subgroups.
29.	18UMAC52	Core Course – X : Real Analysis	1. Learn the basic ingredients of reals and understand the properties of functions defined on the Real line. 2. Develop a sound knowledge and appreciation of the ideas and concepts related to metric spaces. 3. Construct proofs, counter arguments or counter examples in reals. 4. Construct the field axioms of the reals, covers, monotonicity, boundedness. 5. Demonstrate completeness, limits, continuity. 6. Describe and prove continuity conditions for real. 7. Demonstrate compactness and its characterization.
30.	18UMAC53	Core Course –XI: Operations Research	1. Identify and develop operational research models from the verbal description of the real System. 2. Understand the mathematical tools that are needed to solve optimization problems. 3. 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. 4. Able to design new simple models, like CPM, PERT, etc. to improve decision –making and develop critical thinking and objective analysis of decision problems. 5. Formulate simple reasoning, learning and optimization problems, in terms of the representations and methods presented. 6. Demonstrate the hand execution of basic reasoning and optimization algorithms on simple problems.
31.	18UMAC54	Core Course – XII: Mathematical Statistics – I	1. Gain knowledge in basic mathematical statistics. 2. Able to collect, organize, and represent data, and be able to recognize and describe relationships. 3. Demonstrate the relevance and use of statistical tools for analysis and forecasting. 4. Gain the basic knowledge of measures of dispersion like mean, median and mode. 5. Obtain a point estimate for the variance and standard deviation of the conditional distribution of the response variable given a value for the predictor. 6. Determine a probability distribution of random variable (one or two dimensional) in the given situation. 7. Be familiar with techniques to calculate probabilities, expected values and probability, moment and cumulant generating functions for discrete, continuous and multivariate

			random variables and know how to apply these concepts in practical problems.
32.	18UMAO51	Major Elective Course – II: Laplace Transforms and Fourier Series	1. Inculcate the insight knowledge of Laplace Transforms and the conditions for itsexistence. 2. Demonstrate the idea of inverse Laplace Transforms. 3. Able to solve certain equations involving integrals by Laplace Transform. 4. Gain knowledge of even and odd Functions. 5. Introduce the concept of Half Range Fourier Series. 6. Gain an in-depth knowledge of the various aspects of cosine series and change of interval.
33.	18UMAO52	Major Elective Course - II : Introduction to Fractals	1. Introduce the notion of Fall of Determinism. 2. Gain an in-depth knowledge of the Jagged Geometry. 3. Inculcate the basic knowledge of self-similarity. 4. Describe the chaos and fractals in nature. 5. Equip with the basic knowledge of complexity.
34.	18UMAO53	Major Elective Course - II: Fuzzy Sets and Logic	1. Explain the fundamental concepts of fuzzy set. 2. Demonstrate the concept of -cut and its properties. 3. Compute the fuzzy number using the arithmetic operations. 4. Able to know the relation of fuzzy set. 5. Get the inference from conditional, quantified proposition. 6. Get insight into interpersonal communication as an application of fuzzy.

35.	18UMAS51	Skill Based Course - II: Transform Techniques	1. Gain knowledge of Fourier transforms. 2. Learn about the properties of Fourier Transform. 3. Understand the concept of Fourier sine and cosine Transforms. 4. Develop the skill about Z – Transforms and difference equations. 5. Inculcate the basic knowledge of inverse Z – transform.
36.	18UMAS52	Skill Based Course - III: Quantitative Aptitude	1. Able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems. 2. Understanding the properties of proportion and its usage. 3. Examine how to calculate Simple and Compound interest. 4. Able to demonstrate an understanding of the difference between area and perimeter. 5. Able to solve applications involving permutations and combinations. 6. Understanding event, outcome, trial, simple event, sample space and calculate the probability that an event will occur.
SEMESTER – VI			
37.	18UMAC61	Core Course – XIII: Linear Algebra	1. Present basic concepts of vector spaces. 2. Demonstrate concepts of linear transformations. 3. Learn about the span of a set and linear independence. 4. Inculcate basic concepts of matrices and matrix algebra. 5. Present methods of solving systems of linear equations. 6. Present methods of computing eigen values and

			eigenvectors. 7. Demonstrate ability to work within vector spaces and to distil vector space properties
38.	18UMAC62	Core Course - XIV: Complex Analysis	1. Explain the fundamental concepts of complex analysis. 2. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations. 3. Gain knowledge about the elementary transformation and bilinear transformation. 4. Compute the fixed points of a bilinear transformation. 5. Evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem. 6. Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues. 7. Identify the isolated singularities of the function and determine whether they are removable, poles or essential. 8. Use the Residue theorem to compute complex line integral and real integrals.
39.	18UMAC63	Core Course – XV: Graph Theory	1. Understand the basic concepts of graphs. 2. Able to present a graph by matrices. 3. Understand Eulerian and Hamiltonian graphs. 4. Understand the properties of trees. 5. Demonstrate the usage of Euler's Formula.

			6. Find chromatic index and chromatic polynomial for graphs.
40.	18UMAC64	Core Course – XVI : Mathematical Statistics – II	1. Able to understand the significance of the connection between statistics and probability and their applicability to the real world. 2. Explain the concepts of random sampling, statistical inference and sampling distribution, and state and use basic sampling distributions. 3. Frame distribution functions and its types. 4. Gain knowledge about the multivariate distributions. 5. Gain knowledge about Chi-square distribution. 6. Present the ideas about the t and F distributions. 7. Formulate and analyze mathematical and statistical problems, precisely define the key terms, and draw clear and reasonable conclusions using various discrete distributions and estimation theory techniques.
41.	18UMAO61	Major Elective Course – III: Mathematical Modeling	1. Familiarize themselves with the basic knowledge of mathematical modelling and its techniques. 2. Gain knowledge of Mathematical modelling through Geometry, Algebra, Calculus, Differential Equations. 3. Learn about the limitations of Mathematical modelling. 4. Study about Linear Growth and non linear growth with Decay Models. 5. Gain an in-depth knowledge of Mathematical modelling in dynamics through ordinary differential equations.

			6. Study the concept of models in terms of directed Graphs and signed Graphs
42.	18UMAO62	Major Elective Course – III: Stochastic Processes	1. Apply the specialised knowledge in probability theory and random processes to solve practical problems. 2. Gain advanced and integrated understanding of the fundamentals of Markov chains and interrelationship between discrete and continuous random variables and between deterministic and stochastic processes. 3. Evaluate the n-step transition probability. 4. Learn about renewal theory. 5. Demonstrate the transition function and Know about the Birth – Death and Yule process. 6. Study the properties of Poisson process and their characterization.
43.	18UMAO63	Major Elective Course –III: Optimization Techniques	1. Understand and identify the need of using Operations Research techniques. 2. Find optimum solution for real life problems. 3. Gain the knowledge of transportation problem using many techniques. 4. Develop the ability to solve the transhipment problems. 5. Find optimum solution using assignment method. 6. Inculcate the basic knowledge of sequencing problems. 7. Make a wide knowledge in Dynamic programming for solving real life problems.

44.	18UMAS61	Skill Based Course – IV: Lattices and Boolean Algebra	1. Able to recognize, identify, classify and describe the problems of set theory so that they can differentiate between functions and relations. 2. Understand abstract algebraic concepts like posets, lattices, Boolean algebra. 3. Gain an insight into the types of lattices and its properties. 4. Draw a Karnaugh map for a logic system with up to four inputs and use it to minimise the Boolean expression.
45.	18UMAV6P	Value Based Course – II: HTML Lab	1. Designing and implementing dynamic websites with good aesthetic sense. 2. Getting a good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services. 3. Designing web pages through code using HTML. 4. Understanding HTML tags. 5. Gain Knowledge about Creation of application form in web page.