Course Outcome
Department of MATHEMATICS

Sl No.	Paper Title	Paper Code	Course Objective	Course Outcome
1	**CALCULUS**	**CORE-I**	The main emphasis of this course is to equip the student with necessary analytic and technical skills to handle problems of mathematical nature as well as practical problems. More precisely, main target of this course is to explore the different tools for higher order derivatives, to plot the various curves and to solve the problems associated with differentiation and integration of vector functions	Students will be able to know use of Leibnitz's rule and to evaluate derivatives of higher order, to study the geometry of various types of functions, evaluate the area, volume using the techniques of integration, identify the difference between scalar and vector.
2	**DISCRETE MATHEMATICS**	**CORE-II**	This is a preliminary course for the basic courses in mathematics and all its applications. The objective is to acquaint students with basic counting principles, set theory and logic, matrix theory and graph theory.	The acquired knowledge will help students in simple mathematical modeling.
3	**REAL ANALYSIS**	**CORE-III**	The objective of the course is to have the knowledge on basic properties of the field of real numbers, studying Bolzano-Weierstrass Theorem ,	Students will be able to handle fundamental properties of the real numbers that lead to the formal development of real analysis and understand limits and their use in sequences,

			sequences and convergence of sequences, series of real numbers and its convergence etc. This is one of the core courses essential to start doing mathematics.	series, differentiation and integration.
4	**DIFFERENTIAL EQUATIONS**	**CORE-IV**	Differential Equations introduced by Leibnitz in 1676 models almost all Physical, Biological, Chemical systems in nature. The objective of this course is to familiarize the students with various methods of solving differential equations and to have a qualitative applications through models. The students have to solve problems to understand the methods.	Students will be able to solve differential equations and model problems in nature using Ordinary Differential Equations.
5	**THEORY OF REAL FUNCTIONS**	**CORE-V**	The objective of the course is to have knowledge on limit theorems on functions, limits of functions, continuity of functions and its properties, uniform continuity, differentiability of functions, algebra of functions and Taylor's theorem and, its applications. The student how to deal with real functions and understands uniform continuity, mean value theorems.	Students will have working knowledge on the concepts and theorems of the elementary calculus of functions of one real variable and will work out problems on involving derivatives of functions and their applications.

6	**GROUP THEORY-I**	**CORE-VI**	Group theory is one of the building blocks of modern algebra. Objective of this course is to introduce students to basic concepts of group theory and examples of groups and their properties. This course will lead to future basic courses in advanced mathematics, such as Group theory-II and ring theory.	Students will be able to get idea on concept and examples of groups and their properties and understand cyclic groups, permutation groups, normal subgroups and related results.
7	**PARTIAL DIFFERENTIAL EQUATIONS AND SYSTEM OF ODEs**	**CORE-VII**	The objective of this course is to understand basic methods for solving Partial Differential Equations of first order and second order. In the process, students will be exposed to Charpit's Method, Jacobi Method and solve wave equation, heat equation, Laplace Equation etc. They will also learn classification of Partial Differential Equations and system of ordinary differential equations.	Students will be able to take more courses on wave equation, heat equation, diffusion equation, gas dynamics, non-linear evolution equations etc.
8	**NUMERICAL METHODS AND SCIENTIFIC COMPUTING**	**CORE-VIII**	Calculation of error and approximation is a necessity in all real life, industrial and scientific computing. The objective of this course is to acquaint students with various numerical methods of finding solution of different type of problems, which arises in	Students will be able to handle physical problems to find an approximate solution. They will be able to use good mathematical software which will help in getting the accuracy one needs from the computer and can assess the reliability of the numerical results, and determine the effect of round off error or loss of significance.

			different branches of science such as locating roots of equations, finding solution of systems of linear equations and differential equations, interpolation, differentiation, evaluating integration.	
9	**TOPOLOGY OF METRIC SPACES**	**CORE-IX**	This is an introductory course in topology of metric spaces. The objective of this course is to impart knowledge on open sets, closed sets, continuous functions, connectedness and compactness in metric spaces.	Students will be able to learn working with abstract topological spaces.
10	**RING THEORY**	**CORE-X**	This is a second course in modern algebra which deals with ring theory. Some basics of ring theory like rings, subrings, ideals, ring homomorphisms and their properties and. This course is an integral part of any course on Modern algebra the ohers being Group theory and Field Theory.	The course will help students to continue more courses in advanced Ring theory modules, Galois groups.
11	**MULTIVARIABLE CALCULUS**	**CORE-XI**	The objective of this course to introduce functions of several variable to a student after he has taken a course in one variable calculus. The course will introduce partial derivatives and several of its consequences and will	Students will be able to calculate partial derivatives, directional derivatives, extreme values and can calculate double, triple and line integrals. They will have idea of basic vector calculus including green's theorem, divergence theorem and stokes theorem.

			introduce double and triple integrals along with line integrals which are fundamental to all streams where calculus can be used.	
12	**LINEAR ALGEBRA**	**CORE-XII**	Linear algebra is a basic course in almost all branches of science. A full course in undergraduate program will help students in finding real life applications later.. The objective of this course is to introduce a student the basics of linear algebra and some of its application	The students will use this knowledge wherever he/she goes after UG program. It has applications in computer science, finance mathematics, industrial mathematics, bio mathematics etc.
13	**LINEAR PROGRAMMING**	**DSE-I**	The objective of this course is to familiarize industrial problems to students with various methods of solving Linear Programming Problems, Transportation Problems, Assignment Problems and their applications. Also, students will know the application of linear Programming method in Game Theory.	The course will help students in dealing with industrial models.
14	**PROBABILITY AND STATISTICS**	**DSE-II**	The objective of the course is to expertise the student to the extensive role of statistics in everyday life and computation, which has made this course a core course in all branches of mathematical and engineering	The students shall learn probability and statistics for various random variables, multivariate distributions, correlation and relation.

			sciences.	
15	**COMPLEX ANALYSIS**	**CORE-XIII**	The objective of the course is aimed to provide an introduction to the theories for functions of a complex variable. The concepts of analyticity and complex integration are presented. The Cauchy's theorem and its applications, the calculus of residues and its applications are discussed in detail.	Students will be able to handle certain integrals not evaluated earlier and will know a technique for counting the zeroes of polynomials.
16	**GROUP THEORY- II**	**CORE-XIV**	The objective of this course is to be exposed to more advanced results in group theory after completing a basic course. The course introduces results on automorphism, commutator subgroup, group action Sylow theorems etc.	The knowledge of automorphism helps to study more on field theory. Students learn on direct products, group actions, class equations and their applications with proof of all results.
17	**DIFFERENTIAL GEOMETRY**	**DSE-III**	After learning methods on curve tracing and Analytic Geometry, the objective of this course is to teach Differential geometry of curves and surfaces which trains a student using tools in calculus to derive intrinsic properties of plain curves and space curves.	Students will be able to learn Serret-Frenet formulae, relation between tangent, normal and binomials, first and second fundamental forms and idea on various curvatures.
18	**CALCULUS AND DIFFERENTIAL EQUATION**	**GE-I**	The main emphasis of this course is to equip the students with necessary analytic and	After completion of the course, students are expected to be able to apply knowledge of calculus and differential equations in the area of their own

			technical skills to handle problems of a mathematical nature as well as practical problems using calculus and differential equation.	interests.
19	**ALGEBRA**	**GE-II**	The objective is to acquaint the students with the properties of natural numbers that is Euclidian algorithm, congruence relation, fundamental theorems of arithmetic etc. the basics of linear algebra that is vector space, matrices are introduced here.	The acquired knowledge will help students to study further courses in mathematics like brook theory ring theory and field theory and linear algebra. It has applications not only in higher mathematics but also in other science subjects like computer science, statistics, physics, chemistry etc.

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