Semester and subject	Course Outcomes:
Sem-I, Paper-1	This course gives introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. Formal proofs are given lot of emphasis in this course which also enhances understanding of the subject of Mathematics as a whole. The portion on first order, first degree differentials prepares learner to get solutions of so many kinds of problems in all subjects of Science and also prepares learner for further studies of differential equations and related fields.
Sem-I, Paper-2	This course gives expositions to number systems (Natural Numbers & Integers), like divisibility and prime numbers and their properties. These topics later find use in advanced subjects like cryptography and its uses in cyber security and such related fields.
Practical	Students should be able to apply the concepts and techniques learnt in problem solving .
Sem-II, Paper-1	This course gives introduction to functions and their characteristics with rigor and prepares students to study further courses in Analysis. Formal proofs and applications are given lot of emphasis in this course..
Sem-II, Paper-2	This course gives expositions to various counting principles.Students understand how the complicated problems can be made simple & solved using Counting Principles.
Practical	Students should be able to apply the concepts and techniques in problem solving
Sem-III, Paper-1	This Course gives Introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. Formal proofs are given lot of emphasis which also enhance understanding of the subject of Mathematics as whole.
Sem-III, Paper-2 (Linear Algebra I)	This course gives expositions to system of linear equations and matrices, Vector spaces, Basis and dimension
Sem-III, Paper-3	This course prepares learners to get solutions to so many kinds of problems in all subjects of Science and also prepares learners for further studies of differential equations and related fields.
Practical	Students should be able to solve various kind of problems in Mathematics
Sem-IV, Paper-1	This Course gives Introduction to basic concepts of Analysis with rigor and prepares students to study further courses in Analysis. Formal proofs are given lot of emphasis which also enhance understanding of the subject of Mathematics as whole.
Sem-IV, Paper-2 (Linear Algebra II)	This course gives expositions to linear transformation, Inner product space, Eigen values and eigenvectors.
Sem-IV, Paper-3	Learners will learn different types of Numerical methods and statistical methods to apply in different fields of Mathematics.
Practical	Students should be able to solve various kind of problems in Mathematics
Sem-V, Paper-1	In This Course students will learn the basic ideas tools and techniques of integral calculus and use them to solve problems from real life applications including science and engineering problems involving areas, volumes centroides, moments centre of mass, examine vector fields and evaluate line integrals. Use of Greens theorem and other theorems
Sem-V, Paper-2 (Group Theory)	Students will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element, Students will also understand the connection and transition between previously studied mathematics and more advanced mathematics. The students will actively participate in the transition of important concepts such homo- morphisms & isomorphisms from discrete mathematics to advanced abstract mathematics.
Sem-V, Paper-3	This course introduces students to the idea of metric spaces. It extends the idea of open sets, closed sets and continuity to the more general setting of metric spaces along with concepts such as compactness and connectedness. Convergence concepts of sequences and series of functions, power series are also dealt with. Formal proofs are given a lot of emphasis in this course. This course serves as a foundation to advanced courses in analysis. Apart from understanding the concepts introduced, the treatment of this course will enable the learners to explain the reasoning about analysis with clearity and rigour.

Sem-V, Paper-4	Learners identify and apply various properties of and relating to the integers including primes, unique factorization, the division algorithm, and greatest common divisors. Understand the concept of a congruence and use various results related to congruences including the Chinese Remainder Theorem. Identify how number theory is related to and used in cryptography. Learn to encrypt and decrypt a message using character ciphers. Learn to encrypt and decrypt a message using Public-Key cryptology. Learners are able to Solve certain types of Diophantine equations. Represent a Primitive Pythagorean Triples with a unique pair of relatively prime integers.
Sem-V, AC	Students will be able to demonstrate simplex method, Big-M method,Dual Simplex method. Explain the need of Integer programming problem. Demonstrate graphical and Gomory's method. Define various terms used in probability. use discrete and continuous distributions –Binomial,Poisson,Exponential,Rectangular and Normal Use MS-Excel and R software to solve LPP and probability distributions.
Sem V-Practical-1 and 2	Ability to evaluate multiple integral, work done, flux density, volume integral and surface integral. Become well verse with groups, subgroups, order of element, coset, normal subgroups, homomorphism and isomorphism
Sem V-Practical-3 and 4	Students will be able to solve various types of problems,Diophantine Equations using the definitions & concepts mentioned in the syllabus. Students become familiar to the abstractness of the structures of various metric spaces and the properties related to it.
Sem V-Practical AC	Students will be able to solve LPP and IPP using various methods learnt.Solve problems on probability. Practice on EXCEL and R
Sem-VI, Paper-1	Students analyze sequences and series of analytic functions and types of convergence. Students will also be able to to evalute complex contour integrals directly and by fundamental theorem.apply the cauchy integral theorem in various versions and cauchy's integral formula. They will also be able to represent functions Taylor's series power Series and Laurent Series, Classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.
Sem-VI, Paper-2(Ring Theory)	Students will have a working knowledge of important mathematical concepts in abstract algebra such as rings, Euclidean domain, Principal ideal domain and Unique factorization domain. Students will also understand the connection and transition between previously studied mathematics and more advanced mathematics. The students will actively participate in the transition of important concepts such homo-morphisms & isomorphisms from discrete mathematics to advanced abstract mathematics.
Sem-VI, Paper-3	This course introduces students to the idea of metric spaces. It extends the idea of open sets, closed sets and continuity to the more general setting of metric spaces along with concepts such as compactness and connectedness. Convergence concepts of sequences and series of functions, power series are also dealt with. Formal proofs are given a lot of emphasis in this course. This course serves as a foundation to advanced courses in analysis. Apart from understanding the concepts introduced, the treatment of this course will enable the learners to explain the reasoning about analysis with clearity and rigour.
Sem-VI, Paper-4	Express a rational number as a finite continued fraction and hence solve a linear diophantine equation. Express a given repeated continued fraction in terms of a surd. Expand a surd as an infinite continued fraction and hence find a convergent which is an approximation to the given surd to a given degree of accuracy .Solve a Pell equation from a continued fraction expansion Identify certain number theoretic functions and their properties. Investigate perfect numbers and Mersenne prime numbers and their connection..Investigate Pseudo-primes , Carmichael number, primitive roots. Explore the use of arithmetical functions, the Mobius function, and the Euler function

Sem-VI, AC	Students will be able to Use basic terms used in financial mathematics –shares, mutual funds. Learn various methods of solving decision theory problems .Find IRR,PV,NPV,pay back period and use MS-Excel to do it.
Sem VI-Practical-1 and 2	This course introduces students to the idea of metric spaces. It extends the idea of open sets, closed sets and continuity to the more general setting of metric spaces along with concepts such as compactness and connectedness. Convergence concepts of sequences and series of functions, power series are also dealt with. Formal proofs are given a lot of emphasis in this course. This course serves as a foundation to advanced courses in analysis. Apart from understanding the concepts introduced, the treatment of this course will enable the learners to explain the reasoning about analysis with clearity and rigour.
Sem VI-Practical-3 and 4	Students will be able to solve problems on various types numbers ; congruence equations using the definitions & concepts mentioned in the syllabus. students become familiar to the abstractness of the structures of various metric spaces and the properties related to it. They can see the structural properties of convergent and divergent sequences and series of functions.
Sem VI-Practical AC	Solve problems using methods learnt .Use Excel in Financial Mathematics .

Course Outcomes:

(i) Enabling students to develop positive attitude towards mathematics as an interesting and valuable subject

(ii) Enhancing students overall development and to equip them with mathematical modeling, abilities, problem solving skills, creative talent and power of communication.

(iii) Acquire good knowledge and understanding in advanced areas of mathematics and physics.

Course outcomes:

(i) Multivariable Calculus II (Sem V): In this course students will learn the basic ideas, tools and techniques of integral calculus and use them to solve problems from real-life ap- plications including science and engineering problems involving areas, volumes, centroid, Moments of mass and center of mass Moments of inertia. Examine vector fields and define and evaluate line integrals using the Fundamental Theorem of Line Integrals and Green's Theorem; compute arc length.

(ii) Complex Analysis (Sem VI): Students Analyze sequences and series of analytic func- tions and types of convergence, Students will also be able to evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula, they will also be able to represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem.

(iii) Group Theory, Ring Theory (Sem V, Sem VI) Students will have a working knowl- edge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element, rings, Euclidean domain, Principal ideal domain and Unique factorization domain. Students will also understand the connection and transition between previously studied mathematics and more advanced mathematics. The students will actively participate in the transition of important concepts such homo- morphisms & isomorphisms from discrete mathematics to advanced abstract mathematics.

(iv) Topology of metric spaces (Sem V), Topology of metric spaces and real analysis (Sem VI):
This course introduces students to the idea of metric spaces. It extends the ideas of open sets, closed sets and continuity to the more general setting of metric spaces along with concepts such as compactness and connectedness. Convergence concepts of sequences and series of functions, power series are also dealt with. Formal proofs are given a lot of emphasis in this course. This course serves as a foundation to advanced courses in analysis. Apart from understanding the concepts introduced, the treatment of this course will enable the learner to explain their reasoning about analysis with clarity and rigour.

(v) Number Theory and its applications I and II (Sem V, Sem VI):
The student will be able to

a. Identify and apply various properties of and relating to the integers including primes, unique factorization, the division algorithm, and greatest common divisors.
b. Understand the concept of a congruence and use various results related to congruences including the Chinese Remainder Theorem. Investigate Pseudo-primes , Carmichael number, primitive roots.
c. Identify how number theory is related to and used in cryptography. Learn to encrypt and decrypt a message using character ciphers. Learn to encrypt and decrypt a message using Public-Key cryptology.
d. Express a rational number as a finite continued fraction and hence solve a linear diophantine

equation. Express a given repeated continued fraction in terms of a surd. Expand a surd as an infinite continued fraction and hence find a convergent which is an approximation to the given surd to a given degree of accuracy .Solve a Pell equation from a continued fraction expansion

e. Solve certain types of Diophantine equations. Represent a Primitive Pythagorean Triples with a unique pair of relatively prime integers.

f. Identify certain number theoretic functions and their properties. Investigate perfect numbers and Mersenne prime numbers and their connection. Explore the use of arithmetical functions, the Mobius function, and the Euler function.

(VI) Applied Components: Elements of Operations Research