Department of Mathematics.
Course objectives and Outcomes

F.Y.B.Sc.

Sem.-I		
Paper	**Objectives**	**Outcome**
MTH 101: Matrix Algebra	To acquaint the student an elementary level knowledge of Rank and adjoint of matrix, Applications of matrices to system of linear equations, Eigen values and Eigen vectors of matrices and the transformation of matrices. To teach mathematical approaches and models to grow mathematical skill, to improve mathematical thinking and to improve choice making power of the students. To introduce the student applications of matrices.	After successful completion of this course, students are expected to: Understand concepts on matrix operations and rank of the matrix. Understand use of matrix for solving the system of linear equations. Understand basic knowledge of the eigen values and eigen vectors. Apply Cayley-Hamilton theorem to find the inverse of the matrix. Know the matrix transformation and its applications in rotation, reflection, translation.
MTH 102: Calculus	To acquaint the students knowledge of limits and continuity, Differentiations, Mean value theorem, Rolle's theorem, Cauchy's Mean value theorem and Geometrical interpretations. To introduce the concept of successive differentiation. To develop different mathematical models in	After successful completion of this course, the students are expected to: Understand basic concepts on limits and continuity. Understand use of differentiations in various theorems. Know the Mean value theorems and its

	calculus and improve problem solving and logical thinking.	applications. Make the applications of Taylor's, Maclaurin's theorem. Know the applications of calculus.
MTH 103(B): Graph Theory	To introduce the students various types of graphs. To know the applications of graphs in various field.	After successful completion of this course, students are expected to: Draw the graphs with the help of given information. Draw various types of graphs and verify Hand shaking lemma. Know the connected graph and spanning subgraphs. Learn the Hamiltonian graphs and Eulerian graphs. Know the applications of graph.
Sem.-II		
MTH 201: Ordinary Differential Equations	To increase the knowledge of basics of ordinary differential equation and its applications. To imbibe the student different methods of solving differential equations and their applications.	After successful completion of this course, the students are expected to: Understand basic concepts in differential equations. Understand method of solving differential equations Understand use of differential equations in various fields. Understand how to solve the various types of differential equations.

MTH 202: Theory of Equations	To acquaint students with divisibility of numbers and Roots of polynomial. To get the knowledge of relations between roots and coefficients of polynomials of degree less than or equal to 4. To learn Cardon's method for finding roots of cubic equations, biquadratic equations by Descarte's method and roots of polynomial equation s by Newton's method.	After successful completion of this course, the students are expected to: Find out roots of any equation of degree less than or equal to five. Know how the Theory of equations is highly useful in various subjects like algebra, linear algebra, calculus, ordinary and partial differential equations etc.
MTH 203(B): Numerical Analysis	To introduce the students knowledge of different Methods of solution of equations which are algebraic. To acquaint the student basics of interpolation and curve fitting for set of data. To learn methods for solving differential equations. To understand that when exact solutions are difficult to obtain, then approximate solutions can be obtained by using numerical methods.	After successful completion of this course, the students are expected to: Understand basic concepts of methods of solutions of equations viz. bisection, iteration, Newton-Raphson methods and method of false position. Understand methods of curve fitting viz. fitting a Staight line, fitting a polynomial of degree 2 or 3, fitting an exponential curve for the set of given data. Learn Gauss's forward and backward difference formulae and Lagrange's interpolation formula. Use Taylor's series, Euler's method. Modified Euler's method, Runge Kutta methods for solving ordinary differential equations.

S.Y. B.Sc.

Sem.-III		
MTH 231: Calculus of Several variables:	Introduce to calculus of several variables It is used in almost all branches of engineering. It deals with calculus of several variables. To learn homogeneous function, chain rule and Euler's theorem for homogeneous function. To understand the importance of Taylors series for two variables. To learn application of partial differentiation to find extreme value and langrage's method. To understand Mean value theorem. To find area by double integration. To find volume by triple integration	After successful completion of this course, the students are expected to: It is used in almost all branches of engineering. It deals with calculus of several variables. To learn homogeneous function, chain rule and Euler's theorem for homogeneous function. To understand the importance of Taylors series for two variables. To learn application of partial differentiation to find extreme value and langrage's method. To understand Mean value theorem. To find area by double integration. To find volume by triple integration
MTH-232(A): Algebra:	Algebra is science of operations It is widely used in Computer science and T. It is also useful for logic and fuzzy set theory To understand the concept of groups. To understand the concept of subgroups. To learn langrage's theorem	After successful completion of this course, the students are expected to: It is widely used in Computer science and T. It is also useful for logic and fuzzy set theory To understand the concept of groups. To understand the concept

	and its corollaries. To learn Fermat's theorem and Euler's theorem. To learn homomorphism and isomorphism. To understand concept of automorphism of groups . To under the structure of ring, integral domain, field and Boolean ring . To understand basic properties of rings and their types such as integral domain and field.	of subgroups. To learn langrage's theorem and its corollaries. To learn Fermat's theorem and Euler's theorem. To learn homomorphism and isomorphism. To understand concept of automorphism of groups . To under the structure of ring, integral domain, field and Boolean ring . To understand basic properties of rings and their types such as integral domain and field.
MTH 304 Set Theory and Logic	To learn concept of set theory. To learn some standard set such as natural , integer, rational and real numbers. To learn about universal set, empty set, subset. Uses of the language of set theory, designining issues in different subjects of mathematics Understand the issues associated with different types of finite and infinite sets via countable uncountable sets To learn about operations on sets and its applications. To learn logical mathematical reasoning, formulate theorems and definitions To learn statements and truth values; concept of tautology, contradiction and quantifiers	After successful completion of this course, the students are expected to: To learn concept of set theory. To learn some standard set such as natural , integer, rational and real numbers. To learn about universal set, empty set, subset. Uses of the language of set theory, designining issues in different subjects of mathematics Understand the issues associated with different types of finite and infinite sets via countable uncountable sets To learn about operations on sets and its applications. To learn logical mathematical reasoning, formulate theorems and

		definitions To learn statements and truth values; concept of tautology, contradiction and quantifiers.
Sem.IV		
MTH 241: Complex Variables	It is widely used in Fluid Mechanics and Electrical engineering. To learn properties of complex numbers. To understand the use of complex numbers in the field of Calculus. To learn De Moivre's theorem and its applications To learn the importance of analytic functions and C. R. equations. To understand harmonic functions, Laplace differential equation and construction of analytic function. To learn Cauchy's theorem and Cauchy's integral formulae for solving integral. To gain knowledge of singularities and residues. To apply the knowledge of residues in complex integration. To learn the importance of residue theorem for solving integrals	After successful completion of this course, the students are expected to: It is widely used in Fluid Mechanics and Electrical engineering. To learn properties of complex numbers. To understand the use of complex numbers in the field of Calculus. To learn De Moivre's theorem and its applications To learn the importance of analytic functions and C. R. equations. To understand harmonic functions, Laplace differential equation and construction of analytic function. To learn Cauchy's theorem and Cauchy's integral formulae for solving integral. To gain knowledge of singularities and residues. To apply the knowledge of residues in complex integration. To learn the importance of residue theorem for solving integrals

MTH 242(A): Differential Equations:	It is used in all branches of engineering. It is useful for methods of momentum and energy transfer. To study existence and uniqueness about solutions. To learn about the simultaneous differential equations. To learn about the method of solving simultaneous differential equations To learn about the method of variation of parameter for solving differential equations. To understand the methods of solution for total differential equations. To learn difference equation,	After successful completion of this course, the students are expected to: It is used in all branches of engineering. It is useful for methods of momentum and energy transfer. To study existence and uniqueness about solutions. To learn about the simultaneous differential equations. To learn about the method of solving simultaneous differential equations To learn about the method of variation of parameter for solving differential equations. To understand the methods of solution for total differential equations. To learn difference equation,
MTH404 : Vector Calculus	To understand scalar and vector . To learn concept of collinear , coplanar vectors. To understand scalar and vector products. To understand vector valued functions and their limits and continuity and use them to estimate velocity and acceleration of partials. To understand concept of gradient , divergence and Curl. To Calculate the curl and divergence of a vector field.	After successful completion of this course, the students are expected to: To understand scalar and vector . To learn concept of collinear , coplanar vectors. To understand scalar and vector products. To understand vector valued functions and their limits and continuity and use them to estimate

	To learn line integral, conservative vector field Set up and evaluate line integrals of functions along curves. To learn surface integral and greens theorem.	velocity and acceleration of partials. To understand concept of gradient , divergence and Curl. To Calculate the curl and divergence of a vector field. To learn line integral, conservative vector field Set up and evaluate line integrals of functions along curves. To learn surface integral and greens theorem.

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Sem. –V		
MTH - 501: Metric Spaces.	To introduce the students basic knowledge of the metric as a generalization of distance function and basic concepts in metric spaces. To discuss the concepts of limit, continuity, sequences, convergence, etc. To acquaint the students about completeness, connectedness, compactness, etc.	After successful completion of this course, students are expected to: Understand the distance function and term metric space Learn about limit and continuity of metric space. Learn about the open and closed ball , sequence and convergence of metric spaces. Understand the concept of connected, complete, compact metric spaces.
MTH - 502: Real Analysis –I	To acquaint the students Riemann integration, Riemann integrable function and properties of Riemann integrable function. To know the mean value	After successful completion of this course, the students are expected to: Understand the concept of Riemann integration and

	theorems of integral calculus. To introduce the students improper integrals of finite and infinite limit. To imbibe the students beta, gamma functions.	properties of that. Learn the mean value theorem and properties. Know the term improper integrals of finite and infinite limit and their properties. Get the knowledge of beta and gamma functions nad properties.
MTH - 503: Algebra	To introduce the students subgroup, normal subgroup and results. To gain the knowledge of permutation To acquaint the students concepts of rings like ideals, isomorphism of rings and polynomial rings.	After successful completion of this course, students are expected to: Know the applications of permutation group. Understand normal subgroup and group isomorphisms Know Ideals in rings, Quotient Rings and Isomorphism of Rings. Know polynomial Rings and irreducibility of polynomials.
MTH - 504: Lattice Theory	To increase the knowledge of structure of poset and lattice. To observe diagrammatic representation of lattice. To introduce terms maximal & minimal element, greatest & least elements. To acquire the knowledge of the concept of ideals and its properties. To study homomorphism of lattices. To study modular and distributive lattice and their inter-relation. To study complemented and relatively complemented lattice.	After successful completion of this course, the students are expected to: Know the structure of poset and lattice. Represent lattice in diagrammatic form. Get the knowledge of the terms maximal element, minimal element, greatest element, Least elements. Learn the concepts of ideals and their properties. Learn the concepts of homomorphism.

		Understand modular and distributive lattice and their interrelation. Understand complemented and relatively complemented lattice
MTH - 505: Integral Transforms	To acquaint students integral transforms To introduce the students Fourier transform, Inverse Fourier transform. To introduce Z-transform and inverse Z- transform.	After successful completion of this course, the students are expected to: Know the applications of Fourier transform. Know the uses of Fourier transform, Inverse Fourier transform for solving of partial differential equations. Understand the uses of Z-transform.
MTH – 506(B): Number Theory	To introduce the terms prime numbers and conjugate numbers, Diophantine equations, T To imbibe the students theory of congruence's, Perfect numbers, Fibonacci sequence and finite continued fractions.	After successful completion of this course, the students are expected to: Understand how to solve Diophantine equations Use Fermat's theorem, Euler's theorem and Wilson's theorem for finding remainders Understand perfect, Mersenne and Fermat's numbers. Understand Fibonacci sequence Solve Diophantine equations by using finite continued fractions.
MTH – 507: Practical Course based on (MTH-501& MTH-502)	To enhance practical skills of students in concern with problems.	After successful completion of this course students are expected to: Understand how to solve the problems.

		Increase the ability of problem solving.
MTH – 508 :Practical Course based on (MTH-503 & MTH-504)	To enhance practical skills of students in concern with problems.	After successful completion of this course students are expected to: Understand how to solve the problems. Increase the ability of problem solving.
MTH – 509: Practical Course based on (MTH-505 & MTH-506(B))	To enhance practical skills of students in concern with problems.	After successful completion of this course students are expected to: Understand how to solve the problems. Increase the ability of problem solving.
Sem. VI		
MTH - 601: Measure Theory	To introduce the students the basic elementary concepts of Measure Theory. To acquaint the students theorems and uses of measure theory.	After successful completion of this course, students are expected to: Learn measurable sets and properties Understand the sets of measure zero and results of it. Know why theory of integration and measure is needed. Understand Lebesgue integral and properties of the Lebesgue integrals.
MTH - 602: Real Analysis – II	To acquaint the student sequence of real numbers, series function and results. To introduce the student theory of Uniform convergence of sequence of functions and Cauchy's criteria for uniform con. Of sequence of function. To imbibe the students Fourier series.	After successful completion of this course, the students are expected to: Determine the convergence and divergence of the sequence and series. Use the various tests of convergence and

		absolute convergence. Get knowledge about Fourier series for even and odd functions. Understand Sine and cosine series in half range
MTH - 603: Linear Algebra	To introduce the students vector spaces, basis and dimensions. To study Linear transformation also Eigen value and eigen values. To know diagonalization of matrices, congruences, Perfect numbers,	After successful completion of this course, students are expected to: Know about vector spaces, subspaces, etc. Find basis and dimensions of given vector space and matrices and verify Rank and nullity theorem. Use Cayley Hamilton theorem, Euler's theorem and finding Eigen values and Eigen vectors of linear transformation. Understand Kernel and image of linear transformations. Understand Singular and non-singular linear transformations and check diagonaizable matrices.
MTH - 604: Ordinary and Partial Differential Equations	To acquaint the student with types and understanding of the solutions and applications of ordinary differential equations. To study the Non-Linear partial Differential Equation of order one and various methods of solving.	After successful completion of this course, the students are expected to: Know the exact differential equation and its solution, also solution by using integrating factor. Solve the linear differential equation of second order by using various methods.

		Get knowledge of solving Non-Linear partial Differential Equation of order one
MTH - 605: Graph Theory	To provide students with understanding of graph, Trees. Matrix representation of graphs. To improve the knowledge of various graphs, types of graphs, properties of graphs and operation on graphs.	After successful completion of this course, the students are expected to: Understand the preliminary concepts on graphs. Know the uses of graphs and connected graphs. Understand the concepts of Cut set and cut vertices. Know the matrix representation of graphs.
MTH – 606(B): Operations Research	To introduce linear programming problem (LPP). To acquire the knowledge of the simplex method to solve linear programming problem and for unbounded, alternative and infeasible solutions of LPP. To study the initial basic feasible solution of transportation problem (TP) and assignment problem(AP). To study the saddle point, maximin-minimax principal, two person zero sum game. To study 2 s 2 games without saddle point. To study graphical method to solve mx2 and 2xn games and dominance property.	After successful completion of this course, the students are expected to: Understand how to solve the linear programming problem by graphical method and simplex method. Learn the unbounded, alternative and infeasible solutions of LPP by graphical and simplex method. Find the optimal solution of TP by North-West corner method, Matrix minima method (Least cost method), Vogel's approximation method and MODI method. Solve the assignment problems by Hungerian method. Understand the

		unbalanced, balanced, maximization, restricted AP and alternative solution of AP. Understand the saddle point, maximin-minimax principal, two person zero sum game. Use of dominance property to find the solution of game.
MTH – 607: Practical Course based on (MTH-601, MTH-602)	To enhance practical skills of students in concern with problems.	After successful completion of this course students are expected to: Understand how to solve the problems. Increase the ability of problem solving.
MTH – 608: Practical Course based on (MTH-603 & MTH-604)	To enhance practical skills of students in concern with problems.	After successful completion of this course students are expected to: Understand how to solve the problems. Increase the ability of problem solving.
MTH – 609: Practical Course based on (MTH-605, MTH-606(A) or MTH-606(B))	To enhance practical skills of students in concern with problems.	After successful completion of this course students are expected to: Understand how to solve the problems. Increase the ability of problem solving.