Month	No. of Teaching days	SEMESTER-I Honours Course MTMACOR01T Marks:50+25=75 Calculus and Geometry and OrdinaryDifferential Equation	SEMESTER-I Honours Course MTMACOR02T Marks:50+25=75 Algebra	SEMESTER-I General Course MTMGCOR01T Marks:50+25=75 Differential Calculus	Class teaching in hours of each core	Tutorial In hours
July,2020	27	**Unit 1:** i)Leibnitz Rule on diffn. ii)Point of Inflexion iii) Envelopes iv)Asymptote	**Unit -1 :** i)Polar rep. of complex numbers, nth roots of unity, ii)De Moivre's theorem. iii) Theory of equations: Relation between roots and coefficients, Transformation of equation.	i) Limit and Continuity (ε and δ definition), Types of discontinuities, ii) Differentiability of functions, iii)Successive differentiation, Leibnitz's theorem.	Hons-22 Gen-16	HONS-4
August,2020	23	**Unit 1:** v)Curve tracing vi)L'Hospital's rule **Unit- 2** i)Reduction Formulae ii)Arc length of different curves iii) Area of surface of revolution iv) Techniques of sketching of conics	**Unit -1 :** iv**)**Descartes rule of signs, v)Cubic (Cardan's method) and biquadratic equations (Ferrari's method). **vi)Inequality**: The inequality involving AM≥GM≥HM, Cauchy-Schwartz inequality. **Unit -2 :** i) Relation, Partition ii) Mapping	iv) Partial differentiation, Euler's theorem on homogeneous functions v)Tangents and Normals,	Hons-22 Gen-16	HONS-4 Graphical Demonstration (Teaching Aid) Plotting of graphs of function

September;2020	24	**Unit-3** i)Reduction of canonical form ii)Polar Equation of conic iii)Sphere iv)Conicoids	**Unit -2 :** iii)**Integer:** Well-ordering property, Division algorithm, Divisibility and Euclidean algorithm. Congruence. iv)Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic. .	vi) Curvature, vii)Asymptotes, viii)Singular points, ix)Tracing of curves. Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates.	Hons-18 Gen-12	Hons-4 Graphical Demonstration (Teaching Aid) Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.
October;2020	17	**Unit-3** v)Plane sections of conicoids vi))Generating lines vii) Graphing of standard quadric surfaces **Unit -4:** i)Exact Differential equation,	**Unit -3:** Linear Algebra: i) Systems of linear equations, row reduction and echelon forms **Unit 4:**, i) Vector equations, the matrix equation Ax=b,	x) Rolle's theorem, xi)Mean Value theorems	Hons-15 Gen-6	

November,2020	08	**Unit -4:** ii)Integrating factors iii)Linear equation iv)Bernoulli equations	**Unit 4:**, ii) Matrix inverse of a matrix, characterizations of invertible matrices. iii) Rank of a matrix	xii)Taylor's theorem with Lagrange's and Cauchy's forms of remainder. .	Hons-6 Gen-3	Hons-4 Graphical Demonstration (Teaching Aid) Sketching parametric curves (Eg. Trochoid, cycloid, epicycloids, hypocycloid).
Decembr,2020	26	Graphical Demonstration (Teaching Aid)**.** .i)Tracing of conics in Cartesian coordinates/polar coordinates. vi)Sketching ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid, and hyperbolic paraboloid using Cartesian coordinates.	**Unit 4:** **iv)**Eigen values, Eigen Vectors and Characteristic Equation of a matrix. v) Cayley-Hamilton theorem and its use in finding the inverse of a matrix.	xii)Taylor's series, Maclaurin's series of sin x, cos x, e^x, log(l+x), $(l+x)^n$ vxi)Maxima and Minima, xv) Indeterminate forms	Hons-16 Gen-6	Hons-4 Graphical Demonstration (Teaching Aid)**.** iv) Obtaining surface of revolution of curves.

Month	No. of Teaching days	SEMESTER-II Honours Course MTMACOR03T Marks:50+25=75 Real Analysis	SEMESTER-II Honours Course MTMACOR04T Marks:50+25=75 Differential Equation and Vector Calculus	SEMESTER-II General Course MTMGCOR02T Marks:50+25=75 Differential Equation	Class teaching in hours of each core	Tutorial In hours
January'2021	21	**Unit-1:** **i)** Review of Algebraic and Order Properties of $\mathbb{R}$, ε-neighbourhood of a point in $\mathbb{R}$. Idea of countable sets, uncountable sets and unaccountability of $\mathbb{R}$. ii)Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets.	**Unit-1 :** i) Lipschitz condition and Picard's Theorem (Statement only). ii) General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications,	i) First order exact differential equations. Integrating factors, rules to find an integrating factor. ii) First order higher degree equations solvable for x, y, p. Methods for solving higher-order differential equations.	Hons-17 Gen-9	Hons-5
February,2021	22	**Unit-1:** iii) Suprema and Infima, Completeness Property of $\mathbb{R}$ and its equivalent properties. iv) The Archimedean Property, Density of Rational (and Irrational) numbers in $\mathbb{R}$, Intervals. v) Limit points of a set, Isolated points, Open set, closed set. derived set, Illustrations of Bolzano-Weierstrass theorem for sets.	**Unit-1 :** iii) Linear homogeneous and non-homogeneous equations of higher order with constant coefficients, Euler's equation. **Unit -2 :** iv) Method of undetermined coefficients, method of variation of parameters.	iii) Basic theory of linear differential equations, Wronskian, and its properties. iv) Solving a differential equation by reducing its order. v) Linear homogenous equations with constant coefficients, vi) Linear non-homogenous equations, vii) The method of variation of parameters,.	Hons-17 Gen-9	Hons-4

March,2021	26	**Unit-1** **:**vi) compact sets in ℝ, Heine-Borel Theorem. **Unit-2 :** i)Sequences, Bounded sequence, Convergent sequence, Limit of a sequence, lim inf, lim sup. Limit Theorems. Monotone Sequences, Monotone Convergence Theorem.	**Unit-1 :** **v)** System of linear differential equations, types of linear systems, differential operators, an operator method for linear systems with constant coefficients.	viii) The Cauchy-Euler equation, Simultaneous differential equations, Total differential equations. ix)Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations.	Hons-20 Gen-12	Hons-4
April,2021	23	**Unit-2 :** ii) Subsequences, Divergence Criteria. Monotone Subsequence Theorem (statement only). iii)Bolzano Weierstrass Theorem for Sequences. iv) Cauchy sequence, Cauchy'sConvergence criterion.	**Unit -2 :** vi) Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients. vii) Two Equations in two unknown functions. **Unit-3 :** **i)** Equilibrium points, Interpretation of the phase plane.	x) Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method.	Hons-17 Gen-9	Hons-4
May,2021	23	**Unit-3 :** **i)** Infinite series, convergence and divergence of infinite series, Cauchy Criterion.	**Unit-3 :** ii) Power series solution of a differential equation about an ordinary point, solution about a regular singular point.	xi) Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	Hons-17 Gen-9	Hons-4
June,2021	26	**Unit-3 :** ii) Tests for convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's nth root test, Integral test. iii)Alternating series, Leibniz test. Absolute and Conditional convergence.	**Unit- 4 :** i)Triple product, introduction to vector functions, operations with vector-valued functions ii) Limits and continuity of vector functions, differentiation and integration of vector functions.		Hons-16 Gen-0	Hons-2

Month	No. of Teaching days available	SEMESTER-III Honours Course MTMACOR05T Marks:50+25=75 Theory of Real Functions	 MTMACOR06T Marks:50+25=75 Group Theory–I	 MTMACOR07T Marks:50(Th)+ 25(Prac) =75 Numerical Methods	SEMESTER-III General Course MTMGCOR03T Marks:50+25=75 Real Analysis	Class teaching in hours	Tutorial in hours	**MTMACOR07P** Numerical Methods Lab (Marks : 25) **List of practical (using C programming)**	MTMSSEC01M (For both Hons and General) Marks:25 C-Programming Language.
July,2020	27	Unit 1:Limits of functions (ε - δ approach), sequential criterion for limits, divergence criteria. Limit theorems, one sided limits. Infinite limits and limits at infinity. Continuous functions, sequential criterion for continuity and discontinuity.	**Unit-1 :** Symmetries of a square, Dihedral groups, definition and examples of groups including permutation groups and quaternion groups (through matrices), elementary properties of groups.	**Unit-1**: Algorithms, Convergence, Errors: Relative, Absolute. Round off, Truncation. Methods based on interpolations, methods based on finite differences.	i)Finite and infinite sets, examples of countable and uncountable sets. Ii)Real line, bounded sets, suprema and infima, completeness property of R, Archimedean property of R, intervals. Concept of cluster points and statement of Bolzano-Weierstrass theorem.	Hons-22 Gen-16	Hons-4	i)Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + …. + 1/ N. ii)Enter 100 integers into an array and sort them in an ascending order. .	**Unit 1 : Basics of Computer Programming:** Definition, Requirement of programming language, Machine language, high-level programming languages, machine code of a program: compilation process, Problem solving approaches: algorithm and flowchart
August,2020	23	**Unit 1:** Algebra of continuous functions. Continuous functions on an interval, intermediate value theorem, location of roots theorem, preservation of intervals theorem. Uniform	**Unit-2:** Subgroups and examples of subgroups, centralizer, normalizer, centre of a group, product of	**Unit-2:** Transcendental and Polynomial equations: Bisection method, Newton's method, Secant method, Regula falsi method, fixed point	iii)Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and	Hons-20	Hons-4	iii)Solution of transcendental and algebraic equations by a. Bisection method b. Newton Raphson method.	**Unit2: Fundamentals of Programming:** Built in Data Types: int, float, double, char; Constants and Variables; first program: printf(), scanf(), compilation etc., keywords, Arithmetic

		continuity, non-uniform continuity criteria, uniform continuity theorem. **Unit-2**: Differentiability of a function at a point and in an interval, Caratheodory's theorem.	two subgroups.	iteration, Newton-Raphson method. Rate of convergence of these methods.	squeeze theorem, monotone sequences and their convergence (monotone convergence theorem without proof).	Gen-16		c. Secant method. d. Regula Falsi method	operators: precedence and associativity, Assignment Statements: post & pre increment/decrement, logical operators: and, or, not.
September,2020	24	**Unit -2 A**lgebra of differentiable functions. Relative extrema, interior extremum, theorem. Rolle's theorem. Mean value theorem, intermediate value property of derivatives, Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials.	**Unit-3 :** Properties of cyclic groups, classification of subgroups of cyclic groups, Cycle notation for permutations, properties of permutations, even and odd permutations, alternating group, properties of cosets, Lagrange's theorem and consequences including Fermat's Little theorem.	**Unit -3** : System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis, LU Decomposition.	iv)Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof). Definition and examples of absolute and conditional convergence.	Hons-18 / Gen-14	Hons-4	iv)Solution of system of linear equations a.LU decomposition method b. Gaussian elimination method c. Gauss-Jacobi method d. Gauss-Seidel method	**Unit 3 : Statements:** Relational operators, if-else statement, Iterative Statements: for loop, while loop and do-while loop; controlling loop execution: break and continue, nested loop.
October,2020	17	**Unit-3**: Cauchy's mean value theorem. Taylor's theorem with Lagrange's form of remainder, Taylor's theorem with		**Unit-4**: Interpolation: Lagrange and Newton's methods, Error bounds, Finite	v) Sequences of functions.	Hons-3		v) Interpolation a. Lagrange Interpolation b. Newton Interpolation	**Unit 4 : Arrays:** Definition & requirement, declaration & initialization, indexing, one

		Cauchy's form of remainder, application of Taylor's theorem to convex functions, relative extrema. .		difference operators. Gregory forward and backward difference interpolations. Numerical differentiation.		Gen-3			dimensional array: finding maximum, minimum, simple sorting and searching.
November,2020	08	**Unit-3**: Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, ln(1 + x), 1/ax+b and (1 +x)n. Application of Taylor's theorem to inequalities	**Unit-4:** External direct product of a finite number of groups, normal subgroups, factor groups, Cauchy's theorem for finite abelian groups.	**Unit – 5:** Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3rd rule, Simpsons 3/8th rule, Weddle's rule, Boole's rule. Midpoint rule, Composite Trapezoidal rule, Composite Simpson's 1/3rd rule, Gauss quadrature formula. The algebraic eigenvalue problem: Power method.	vi)Series of functions, Point-wise and uniform convergence. Mn-test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions.	Hons-20 Gen-16	Hons-4	vi)Numerical Integration a. Trapezoidal Rule b. Simpson's one third rule c. Weddle's Rule d. Gauss Quadrature vii)Method of finding Eigen-value by Power method viii)Fitting a Polynomial Function	**Unit 5 : Multi-dimensional arrays:** Matrix Manipulations (Addition, Multiplication, Transpose) Arrays and Pointers, Memory allocation and deallocation: *malloc()* and *free()* functions
Decembr,2020	26	.	**Unit-5:** Group homomorphisms, properties of homomorphisms, Cayley's theorem, properties of isomorphisms, First, Second and Third	**Unit – 6:** Ordinary Differential Equations: The method of successive approximations, Euler's method, the modified Euler method, Runge-Kutta methods of	vii)Power series and radius of convergence.	Hons-14	Hons-2	ix)Solution of ordinary differential equations a. Euler method b. Modified Euler method c. Runge Kutta method	**Unit6 : Functions:** Why?, How to declare, define and invoke a function, Variables' scope, local& global variables and function parameters, Pointers, arrays as function parameters, *return* statement, Header

			isomorphism theorems	orders two and four.		Gen-08			files and their role. Illustrate different examples like swapping values, compute n!, nCr, find max/min from a list of elements, sort a set of numbers, matrix addition/multiplication etc.
Month	No. of Teaching days available	SEMESTER-IV Honours Course MTMACOR08T Marks:50+25=75 Riemann Integration and Series of Functions			SEMESTER-IV General Course MTMGCOR04T Marks:50+25=75 Algebra	Class teaching in hours of each core	Tutorial In hours	MTMSSEC02M (For both Hons and Gen) Marks:25 Logic and Sets	
		MTMACOR09T Marks:50+25=75 Multivariate Calculus	MTMACOR10T Marks:50(Th)+ 25(Prac) =75 Ring Theory and Linear Algebra I						
January'2021	21	**Unit -1:** Riemann integration: inequalities of upper and lower sums, Darbaux integration, Darbaux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums,	**Unit-1:** Functions of several variables, limit and continuity of functions of two or more variables Partial differentiation,	**Unit 1:** Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring. Ideal, ideal generated by a subset of a ring,	Equivalence relations and partitions, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set. Definition and examples of groups, examples of abelian and non-abelian	Hons-17	Hons-4	**Unit 1 :** Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical	

		equivalence of two Definitions. Riemann integrability of monotone and continuous functions, Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals, Fundamental theorem of Integral Calculus.	total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters,.	factor rings, operations on ideals, prime and maximal ideals.	groups, the group Zn of integers under addition modulo n and the group U(n) of units under multiplication modulo n.	Gen-8		operators.
February,2021	22	**Unit-2 :** Improper integrals, Convergence of Beta and Gamma functions.	**Unit-1:D**irectional derivatives, the gradient, maximal and normal property of gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems.	**Unit 2 :** Ring homomorphism's, properties of ring homomorphism's. Isomorphism theorems I, II and III, field of quotients.	Cyclic groups from number systems, complex roots of unity, circle group, the general linear group GLn(n,R), Groups of symmetries of (i) an isosceles triangle, (ii)an equilateral triangle,(iii) a rectangle, and (iv) a square.	Hons-17 Gen-8	Hons-4	**Unit-1:** Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.

March,2021	26	**Unit-3 :** Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions, Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test. integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.	**Unit-2** : Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, Triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical coordinates. Change of variables in double integrals and triple integrals.	**Unit 3 :** Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.	The permutation group Sym (n), Group of quaternions. Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of group, examples of subgroups including the center of a group. Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups.	Hons-20 Gen-8	Hons-4	**Unit 2 :** Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.
April,2021	23	**Unit 4:** Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity,	**Unit-3** : Definition of vector field, divergence and curl. Line integrals,	**Unit 4 :** Introduction to linear transformations, Subspaces, dimension of	Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Zn the	Hons-18	H0ns-4	**Unit 3 :** Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set.

		Dirichlet's condition. Examples of Fourier expansions and summation results for series.	Applications of line integrals: Mass and Work. Fundamental theorem for line integrals, conservative vector fields, independence of path.	subspaces, null space, range, rank and nullity of a linear transformation.	ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions.	Gen-7		Composition of relations, Types of relations, Partitions,
May,2021	23	**Unit – 5:** Power series, radius of convergence, Cauchy Hadamard Theorem. Differentiation and integration of power series; Abel's Theorem; Weierstrass Approximation Theorem.	**Unit-4** : Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.	matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms. Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.	Subrings and ideals, Integral domains and fields, examples of fields: Zp, Q, R, and C. Field of rational functions.	Hons-18 Gen-7	Hons-4	**Unit-3:**Equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- ary relations.
June,2021	26					Hons- Gen-	Hons-	

		SEMESTER-V			SEMESTER-V				
		Honours Course				General Course			
Month	**No. of Teaching days available**	MTMACOR11T Marks:50+25=75 PDE and applications of ODE	MTMACOR12T Marks:50+25=75 Group Theory–II	MTMADSE01T Marks:50+25=75 LPP	MTMADSE02T Marks:50+25=75 Number Theory	MTMGDSE01T Marks:50+25=75 Matrices ,	Class teaching in hours of each core	Tutorial in hours	MTMSSEC01M (For both Hons and General) Marks:25 C-Programming Language.
July,2020	27	Unit 1: Partial Differential Equations – Basic concepts and Definitions. Mathematical Problems. First-Order Equations: Classification, Construction and Geometrical Interpretation. Method of Characteristics for obtaining General Solution of Quasi Linear Equations.	Unit 1: Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups.	Unit 1: Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables,	Unit 1: Linear Diophantine equation, prime counting function, statement of prime number theorem, Gold Bach conjecture, linear congruences, complete set of residues.	Unit 1:R, R2, R3 as vector spaces over R. Standard basis for each of them. Concept of Linear Independence and examples of different bases. Subspaces of R2, R3.	Hons-22 Gen-12	Hons-4	**Unit 1 : Basics of Computer Programming:** Definition, Requirement of programming language, Machine language, high-level programming languages, machine code of a program: compilation process, Problem solving approaches: algorithm and flowchart.

August,2020	23	Unit 1: Canonical Forms of First-order Linear Equations. Method of Separation of Variables for solving first order partial differential equations Unit 2: Derivation of Heat equation, Wave equation and Laplace equation.	Unit 1: Applications of factor groups to automorphism groups, Characteristic subgroups, Commutator subgroup and its properties.	Unit 1: Two-phase method. Big-M method and their comparison. Unit 2 : Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.	Unit 1: Chinese Remainder theorem, Fermat's Little theorem, Wilson's theorem. Unit 2 : Number theoretic functions, sum and number of divisors, totally multiplicative functions.	Unit 1: Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of Eigen values and Eigen vectors for such transformations and Eigen spaces as invariant subspaces	Hons-22 Gen-12	Hons-4	**Unit2: Fundamentals of Programming:** Built in Data Types: int, float, double, char; Constants and Variables; first program: printf(), scanf(), compilation etc., keywords, Arithmetic operators: precedence and associativity, Assignment Statements: post & pre increment/decrement, logical operators: and, or, not.
September,2020	24	Unit2: Classification of second order linear equations as hyperbolic, parabolic or elliptic. Reduction of second order Linear Equations to canonical forms. Unit 3: The Cauchy problem, Cauchy-Kowalewskaya	Unit 2: Properties of external direct products. the group of units modulo n as an external direct product, internal direct products, Fundamental Theorem of finite abelian groups.	Unit 2: Transportation problem and its mathematical formulation, northwest-corner method, least cost method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation	Unit 2: Definition and properties of the Dirichlet product, the Mobius Inversion formula, the greatest integer function, Euler's phi-function, Euler's theorem, reduced set of residues. Some properties of Euler's phi-function.	Unit 2: Types of matrices. Rank of a matrix. Invariance of rank under elementary transformations. Reduction to normal form, Solutions of linear homogeneous and non-homogeneous equations with number of equations and unknowns upto four.	Hons-22	Hons-4	**Unit 3 : Statements:** Relational operators, if-else statement, Iterative Statements: for loop, while loop and do-while loop; controlling loop execution: break and continue, nested loop.

		theorem, Cauchy problem of an infinite string,		problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.			Gen-12		
October,2020	17	Unit 3: Initial Boundary Value Problems. Semi-Infinite String with a fixed end, Semi-Infinite String with a Free end. Equations with non-homogeneous boundary conditions. Non-Homogeneous Wave Equation. Method of separation of variables, Solving the Vibrating String Problem. Solving the Heat Conduction problem	Unit 3 : Group actions, stabilizers and kernels, permutation representation associated with a given group action. Applications of group actions. Generalized Cayley's theorem. Index theorem		Unit 3 : Order of an integer modulo n, primitive roots for primes, composite numbers having primitive roots, Euler's criterion,	Unit 2: Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations.	Hons-15 Gen-6		**Unit 4 : Arrays:** Definition & requirement, declaration & initialization, indexing, one dimensional array: finding maximum, minimum, simple sorting and searching.

November,2020	08	Unit 4: Central force.	Unit 4 : Groups acting on themselves by conjugation, class equation and consequences, conjugacy in Sn, p groups.	Unit 3 : Game theory: Formulation of two person zero sum games.	Unit 3 : The Legendre symbol and its properties.	Unit 3:Rank of matrix.	Hons-6	Hons-4	**Unit 5 : Multi-dimensional arrays:** Matrix Manipulations (Addition,Multiplication, Transpose) Arrays and Pointers, Memory llocation and deallocation: *malloc()* and *free()* functions.
							Gen-3		
Decembr,2020	26	Unit 4: Constrained motion, varying mass, tangent and normal components of acceleration, modelling ballistics and planetary motion, Kepler's second law.	Unit 4 : Sylow's theorems and consequences, Cauchy's theorem, Simplicity of An for n ≥ 5, non-simplicity tests.	Unit 3 : Solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.	Unit 3 : Quadratic reciprocity, quadratic congruences with composite moduli, Public key encryption, RSA encryption and decryption, the equation x2 + y2 = z 2 , Fermat's Last theorem.	Unit 3: Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.	Hons-20	Hons-2	**Unit6 : Functions:** Why?, How to declare, define and invoke a function, Variables' scope, local& global variables and function parameters, Pointers, arrays as function parameters, *return* statement, Header files and their role. Illustrate different examples like swapping values, compute n!, nCr, find max/min from a list of elements, sort a set of numbers, matrix addition/multiplication etc.
							Gen-08		

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		SEMESTER-VI			SEMESTER-VI				
		Honours Course				General Course			
Month	**No. of Teaching days available**	MTMACOR13T Marks:50+25=75 Metric Spaces and Complex Analysis	MTMACOR14T Marks:50+25=75 Ring Theory and Linear Algebra II	MTMADSE04T Marks:50+25=75 Theory of Equations	MTMADSE06T Marks:50+25=75 Mechanics	MTMGDSE03T Marks:50+25=75 Numerical Methods	Class teaching in hours of each core	Tutorial in hours	MTMSSEC02M (For both Hons and General) Marks:25 Logic and Sets
January-2021	21	Unit-1: Metric spaces: Definition and examples. Open and closed balls, neighbourhood, open set, interior of a set. Limit point of a set, closed set, diameter of a set, subspaces, dense sets, separable spaces. Sequences in Metric Spaces, Cauchy sequences. Complete Metric Spaces, Cantor's theorem.	Unit 1 : Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains,	Unit 1 : General properties of polynomials, Graphical representation of a polynomial, maximum and minimum values of a polynomials, General properties of equations, Descartes's rule of signs positive and negative rule,	Unit 1: Co-planar forces. Astatic equilibrium. Friction. Equilibrium of a particle on a rough curve. Virtual work.	Unit 1: Algorithms, Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method.	Hons-18 Gen-9	Hons-6	**Unit 1 :** Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, bi-conditional propositions, converse, contra positive and inverse propositions and precedence of logical operators.

February,2021	22	Unit 2: Continuous mappings, sequential criterion and other characterizations of continuity, Uniform continuity, Connectedness, connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, Totally bounded spaces, finite intersection property, and continuous functions on compact sets. Homeomorphism, Contraction mappings, Banach Fixed point Theorem and its application to ordinary differential equation.	Unit 1: Factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, and unique factorization in Z [x]. Divisibility in integral domains, irreducible, primes, unique factorization domains, Euclidean domains.	Unit 1 : Relation between the roots and the coefficients of equations. Unit 2: Symmetric functions. Applications of symmetric function of the roots.	Unit 1: Forces in three dimensions. General conditions of equilibrium. Centre of gravity for different bodies. Stable and unstable equilibrium.	Unit 1 : Secant method, LU decomposition, Gauss-Jacobi, Gauss-Seidel and SOR iterative methods.	Hons-18 Gen-9	Hons-6	**Unit-1:** Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.

March,2021	26	Unit 3 : Limits, Limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.	Unit 2 : Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators.	Unit 2: Transformation of equations. Solutions of reciprocal and binomial equations. Algebraic solutions of the cubic (Cardan's method) and biquadratic (Ferrari's method). Properties of the derived functions.	Unit 2 : Equations of motion referred to a set of rotating axes. Motion of a projectile in a resisting medium. Stability of nearly circular orbits. Motion under the inverse square law.	Unit 2:Lagrange and Newton interpolation: linear and higher order, finite difference operators..	Hons-22 Gen-10	Hons-8	**Unit 2 :** Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.

April,2021	23	Unit 4 : Analytic functions, examples of analytic functions, exponential function, Logarithmic function, trigonometric function, derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula.	Unit 2 : Eigen spaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator, canonical forms.	. Unit 3 : Symmetric functions of the roots, Newton's theorem on the sums of powers of roots, homogeneous products, limits of the roots of equations.	Unit 2: Slightly disturbed orbits. Motion of artificial satellites. Motion of a particle in three dimensions. Motion on a smooth sphere, cone, and on any surface of revolution.	Unit 2: Numerical differentiation: forward difference, backward difference and central Difference			**Unit 3 :** Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set. Composition of relations, Types of relations, Partitions,
May,2021	23	Unit 5: Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, 20 Taylor series and its examples	Unit 3 : Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessel's inequality, the adjoint of a linear operator, Least Squares Approximation.	Unit 4: Separation of the roots of equations, Strums theorem.	Unit 3: Degrees of freedom. Moments and products of inertia. Momental Ellipsoid. Principal axes. D'Alembert's Principle. Motion about a fixed axis..	Unit 2: Integration: trapezoidal rule, Simpson's rule,			**Unit-3:** Equivalence Relations with example of congruence modulo relation. Partial ordering relations, n- ary relations

June,2021	26	Unit 6 : Laurent series and its examples, absolute and uniform convergence of power series.	Unit 3 : Minimal solutions to systems of linear equations, Normal and self-adjoint operators, Orthogonal projections and Spectral theorem.	Unit 4: Applications of Strum's theorem, Conditions for reality of the roots of an equation. Solution of numerical equations	Unit 3: Compound pendulum. Motion of a rigid body in two dimensions under finite and impulsive forces. Conservation of momentum and energy	Unit 2: Euler's method for solving ordinary differential equations.			