Dinabandhu Mahavidyalaya Department of Mathematics Lesson Plan Under NEP-2020 Session: 2023-2024 West Bengal State University Honours Course Semester-I -II

## Dinabandhu Mahavidyalaya, Bongaon. Lesson Plan (NEP-2020), 2023-2024, Department of Mathematics under West Bengal State University Honours Course

Month	No. of	SEMESTER-I (JULY,2023-DEC,2023)	Class	Tutorial
	Teaching	Course type: Major, Course Code: DS-1	teaching	in hours
	available	Credit Pattern (L: I: P) = $4.110$ , Marks = $100$ , Credit = $5$ Tonic: Algebra	in nours	
July,2023	22	<ul> <li>Unit -1: Classical Algebra Complex Numbers</li> <li>i) De-Moivre's theorem for integer and rational indices,</li> <li>ii) The n-th roots of unity,</li> <li>iii) Definitions of exponential and trigonometrical functions of a complex variable, exponential values of sine and cosine.</li> </ul>	12	2
August,2023	24	<ul> <li>Unit -1: Classical Algebra</li> <li>iv)Periods of exponential and trigonometrical functions,</li> <li>v)Logarithm of a complex number and its properties,</li> <li>vi)Definitions of a<sup>z</sup>,</li> <li>vii)Inverse circular functions,</li> <li>viii) Hyperbolic functions.</li> <li>Theory of Equations <ul> <li>i)General properties of polynomials and polynomial equations,</li> <li>ii)Fundamental theorem of Algebra ,</li> <li>iii)Fundamental theorem of Algebra ,</li> <li>iii)Relation between roots and coefficients,</li> <li>iv)Transformation of equation,</li> <li>v)Equation of squared differences of a cubic,</li> <li>vi) Nature of the roots of a cubic,</li> <li>vii) Reciprocal equations,</li> <li>viii) Binomial equations and their properties,</li> <li>ix) Special roots of x<sup>n</sup> = 1,</li> <li>x)Descartes' rule of signs,</li> <li>xii) Theorems on imaginary, integral and rational roots,</li> <li>xiii)Newton's method for integral roots,</li> <li>xiii)Newton's method for integral roots,</li> <li>xiv)Cardan's solution of the cubic,</li> <li>xv)Descartes' and Ferrari's methods of solution of biquadratic equations,</li> <li>xvi) Sturm's theorem and its applications.</li> </ul> </li> </ul>	18	3

September, 2023	22	<pre>Unit -1: Classical Algebra Inequalities i) AM ≥ GM ≥ HM, ii)Extreme values of sum and product, iii) Theorem of weighted means, iv) Weierstrass' &amp; Cauchy's inequalities, v) m-th and generalized m-th power theorems. Unit -2: Number Theory i)Equivalence relations and Partitions, ii)Functions, iii) Invertible functions, One to one correspondence and cardinality of a set, iv)Permutations, Sign of a permutation, Inversions, Cycles and Transpositions.</pre>	18	3
October,2023	13	<ul> <li>Unit -2: Number Theory</li> <li>i)Well-ordering principle of non-negative integers,</li> <li>ii)Principles of Mathematical Induction of positive integers,</li> <li>iii)Division Algorithm, Divisibility and Euclidean algorithm,</li> <li>iv) GCD, Bezout's Theorem,</li> <li>v) Primes, Euclid's proof of infinitely many primes,</li> <li>vi)Statement of Fundamental Theorem of Arithmetic,</li> <li>vii)Congruence relation between integers,</li> <li>viii)Euler φ function, Euler's theorem,</li> <li>ix)Fermat's Theorem.</li> </ul>	10	2
November,2023	11	Unit – 3: Matrix Theory i)Matrix of real and complex numbers, ii)Algebra of matrices, iii) Symmetric and Skew Symmetric matrices, iv)Hermitian and Skew- Hermitian matrices, v)Orthogonal and Unitary matrices. vi)Determinants, vii)Laplace expansions, viii)cofactors, Adjoint, ix)inverse of a matrix, x)Cramer`s Rule.	10	2
		<b>Unit – 3: Matrix Theory</b> xi) Elementary row and Elementary column operations on matrices, xii)Elementary matrices, xiii)Echelon form, xiv)Triangular factorization of matrices: A = LU, A = L D V, PA = LU, EA = R, xv)Product of Elementary matrices and inverse of a matrix,		

	20	xvi)Rank of a matrix,	18	3
December,2023		xvii)Determination of rank		
· · · · · · · · · · · · · · · · · · ·		xviii)System of linear equations in matrix form AX = B and its Consistency and		
		inconsistency		
		xix)Types and determination of solution (by using notion of rank),		
		xx)Solution by using Gaussian elimination, Gauss-Jordan row reduction, Reduced row		
		echelon form,		
		xxi)Eigenvalues, Eigenvectors of matrices and its properties,		
		xxii)Cayley-Hamilton theorem, and determining inverse of square matrix.		

Month	No. of	SEMESTER-II (JAN,2024-JUNE,2024)	Class	Tutorial
	Teaching	Course type: Major, Course Code: DS-2	teaching	in hours
	available		in nours	
January 2024	18	Unit – 1 : Limits, Continuity and Differentiability i)Limit of a function, Infinite limits, ii)Continuity and types of discontinuities iii)Differentiability of a function, iv)Relation between differentiability and continuity.	12	2
February, 2024	22	<ul> <li>Unit – 1 : Limits, Continuity and Differentiability</li> <li>v)Successive differentiation,</li> <li>vi) Leibnitz theorem, its applications to different functions</li> <li>vii)Partial differentiation,</li> <li>viii) Euler's theorem on homogeneous functions and its converse.</li> </ul>	18	2
March, 2024	22	<ul> <li>Unit - 2 : Mean Value Theorems and its Applications</li> <li>i)Rolle's theorem,</li> <li>ii)Lagrange's Mean Value Theorem,</li> <li>iii)Cauchy's Mean Value Theorem,</li> <li>iv)Geometrical interpretation of MVT,</li> <li>v)Taylor's theorem,</li> <li>vi)Taylor's series,</li> <li>vii)Maclaurin's series</li> <li>viii) Indeterminate forms.</li> <li>Unit -3 : Integral Calculus</li> <li>i)Integration of rational and irrational functions,</li> <li>ii)Evaluation of Definite Integrals,</li> <li>iii)Special integrals,</li> <li>iv)Reduction formulae,</li> <li>v)Improper Integrals,</li> <li>vi)Beta and Gamma functions.</li> </ul>	18	2
April, 2024	23	Unit – 4 : Applications i)Tangent and Normal, ii)Curvature, iii) Asymptotes, iv)Envelopes, v)Maxima and Minima, vi)Concavity and Convexity, vii)Points of inflexion.	18	2

May, 2024	22	<ul> <li>Unit - 4 : Applications</li> <li>viii)Tracing of Cartesian and Polar curves,</li> <li>ix) Length of plane curve,</li> <li>x)Area bounded by plane curves,</li> <li>xi)Volume and Surface area of solids of revolution.</li> <li>Graphical Demonstration (Teaching Aid)</li> <li>i) <i>Plotting of graphs of function</i> e <sup>ax+b</sup>, log(ax + b), 1/(ax + b), sin(ax + b), cos (ax + b),  ax + b  and to illustrate the effect of a and b on the graph.</li> <li>ii). Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.</li> <li>iii) Sketching parametric curves.</li> <li>iv) Obtaining volume and surface of revolution of curves.</li> <li>v) Tracing of conics in Cartesian coordinates/polar coordinates.</li> </ul>	12	2
June,2024	24	University Examinations		

Dinabandhu Mahavidyalaya Department of Mathematics Lesson Plan Under Choice Based Credit System(CBCS) Session: 2023-2024 West Bengal State University Honours Course Semester-III -VI

				SEMESTER	-III			
	No. of Teaching			Торіс			Class teaching in	Tutorial In hours
Month July, 2023	days available	MTMACOR05T Marks:50+25=7 5 Theory of Real Functions	MTMACOR06T Marks:50+25=75 Group Theory-I	MTMACOR07T Marks:50(Th)+ 25(Prac) =75 Numerical Methods	MTMACOR07P Numerical Methods Lab (Marks : 25) List of Practical. (using C)	MTMSSEC01M (For both Hons and General)	hours	
July, 2023	22	<b>Unit 1</b> i)Limits of functions $(\varepsilon - \delta \text{ approach}),$ ii) Sequential criterion for limits, divergence criteria. iii)Limit theorems, one sided limits. Infinite limits and limits at infinity. iv)Continuous functions, v) Sequential criterion for continuity and discontinuity.	Unit-1 i)Symmetries of a square, ii)Dihedral groups, iii) Definition and examples of groups including permutation groups and quaternion groups (through matrices), iv) Elementary properties of Groups.	Unit-1 i)Algorithms, ii) Convergence, iii)Errors: Relative, Absolute. Round off, Truncation. Iv)Methods based on interpolations, methods based on finite differences.	1.Calculate the sum 1/1 + 1/2 + 1/3 + 1/4 + +1/ N. 2.Enter 100 integers into an array and sort them in an ascending order.	Unit 1 i)Basics of Computer Programming: ii) Definition, Requirement of programming language, iii)Machine language, high-level programming languages, machine code of a program: compilation process, iv)Problem solving approaches: algorithm and flowchart	63	4
		Total no. of classes=16	Total no. of classes=12	Total no. of classes=20	Total no. of classes=10	Total no. of classes=5		
August, 2023	24	Unit 1 vi)Algebra of Continuous functions. vii)Continuous functions on an interval, viii) Intermediate value theorem, ix)Location of roots theorem, preservation of intervals theorem. x)Uniform continuity, non- uniform	Unit-2 i)Subgroups and examples of subgroups, ii)Centralizer, iii) Normalizer iv)Center of a group, v)Product of two subgroups.	Unit-2 i) Transcendental and Polynomial equation. ii)Bisection method, iii)Newton's method, iv)Secant method, v) Regula Falsi method, vi)Fixed Point Iteration, vii)Newton-Raphson method. viii)Rate of Convergence of above methods,	<ul> <li>3.Solution of transcendental and algebraic equations by</li> <li>a) Bisection method,</li> <li>b) Newton Raphson method.</li> <li>c)Secant method.</li> <li>d)Regula Falsi method</li> </ul>	Unit2 i)Fundamentals of Programming: ii)Built in Data Types: int, float, double, char; iii) Constants and Variables; first program: printf(), scanf(), compilation etc., iv)Keywords, Arithmetic operators: precedence and associativity, v)Assignment Statements: post ⪯	66	4

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			continuity criteria, xi) Uniform Continuity theorem. <b>Unit-2</b> Differentiability of a function at a point and in an interval, Caratheodory's theorem				increment /decrement, logical operators: and, or, not.		
			Total no. of classes=20	Total no. of classes=16	Total no. of classes=18	Total no. of classes=8	Total no. of classes=4		
S	September, 2023	22	Unit-2 iii)Algebra of differentiable functions. iv)Relative extrema, interior extremum, theorem. v)Rolle's theorem iv)Mean value theorem, v) Intermediate value property of derivatives, vi) Darboux's theorem. vii)Applications of Mean value theorem to inequalities and approximation of polynomials.	Unit-3 i)Properties of cyclic groups, ii)Classification of subgroups of Cyclic G r o u p s , iii)Cycle notation for permutations, iv)Properties of permutations v)Even and odd permutations, alternating group, vi)Properties of cosets, vii)Lagrange's theorem v i i i ) C onsequences including Fermat's Little theorem.	Unit-3 i)System of linear algebraic equations: a) Gaussian Elimination method b) Gauss Jordan methods. c) Gauss Jacobi method, d)Gauss Seidel method and their convergence analysis, ii)LU Decomposition.	4.Solution of system of linear equations by using i)LU decomposition method, ii)Gaussian elimination method, iii)Gauss-Jacobi method, iv)Gauss-Seidel method.	Unit 3 Statements i)Relational operators, if- Iterative ii) Statements: for while loop; controlling and continue, nested loop.	62	4
			Total no. of classes=20	Total no. of classes=16	Total no. of classes=14	Total no. of classes=8	Total no. of classes=4		
	October, 2023	13	Unit-3 i)Cauchy's mean value theorem. ii)Taylor's theorem with Lagrange's form of remainder, iii)Taylor's theorem with Cauchy's form of remainder	Unit 4 i)External direct product of a finite number of groups, ii)Normal subgroups,	Unit-4 Interpolation: i) Lagrange and Newton's methods, ii) Error bounds, Finite difference operators. iii)Gregory forward and backward difference interpolations. iv)Numerical differentiation.	.5. Interpolation i)Lagrange interpolation , ii)Newton Interpolation 6.Numerical Integration: i)Trapezoidal Rule.	Unit 4 Arrays: i)Definition requirement, declaration & initialization, indexing, ii)One dim. array: finding maximum, minimum, iii)Simple sorting and searching	35	2
			Total no. of classes=9	Total no. of classes=6	Total no. of classes=12	Total no. of classes=5	Total no. of classes=3		

November ,2023	11	Unit-3 iv)Application of Taylor's theorem to convex functions, relative extrema. v)Application of Taylor's theorem to inequalities	Unit 4 iii)Factor groups, iv)Cauchy's theorem for finite abelian groups.	Unit 5 i)Numerical Integration: a) Newton Cotes formula, b) Trapezoidal rule, c) Simpson's 1/3rd rule, d)Simpsons 3/8 <sup>th</sup> rule, e) Weddle's rule, f) Boole's rule. g) Midpoint rule, h) Composite Trapezoidal rule, ix)Composite Simpson's 1/3rd rule, ii)Gauss quadrature formula. iii)The algebraic Eigen- value problem: Power method.	6.Numerical Integration: ii)Simpson's one third rule, iii) Weddle's Rule, iv) Gauss Quadrature v)Method of finding Eigen- value by Power method v i ) Fitting a Polynomial Function.	Unit 5 i)Multi- dimensional arrays: ii)Matrix Manipulations (Addition, Multiplication, Transpose) iii)Arrays and Pointers, iv)Memory location and deallocation: <i>malloc ()</i> and <i>free()</i> functions.	30	2
		Total number of classes=8	Total number of classes=6	Total number of classes=9	Total number of classes=5	Total number of classes=2		
December 2023	20	<b>Unit-3</b> vi)Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions like ln(1 + x), 1/ax+b and (1 +x)n.	Unit-5 i)Group Homomorphism, ii) Properties of Homomorphism, iii) Cayley's theorem, iv) Properties of Isomorphism, v)First, Second and Third Isomorphism theorems.	Unit 6 Ordinary Differential Equations: i)The method of successive approximations, ii) Euler's method, iii)The modified Euler method, iv)Runge-Kutta methods of orders two and four.	7.Solution of ordinary differential equations by i)Euler method, ii) Modified Euler method iii)Runge Kutta method	Unit6 Functions: i) Why?, How to declare, define and invoke a function, Variables' scope, local global variables and function parameters, ii)Pointers, arrays as function parameters, <i>return</i> statement, i i i) Header files and their role iv)Illustrate different examples like swapping values, compute n!, nCr, find max/min from a list of elements, sort a set of numbers, v)matrix addition /multiplication etc.	38	2
		Total number of classes=8	Total number of classes=12	Total number of classes=10	Total number of classes=5	Total number of classes=3		

			SEI	MESTER-IV			
	No. of Teach ing		Торі	c		Class teaching in hours	Tutorial In hours
Month January, 2024 February, 2024 March,	days availa ble	MTMACOR0 8T Marks:50+25= 75 Riemann Integration and Series of Functions	MTMACOR09T Marks:50+25=75 Multivariate Calculus	MTMACOR10T Marks:50(Th)+ 25(Prac) =75 Ring Theory and Linear Algebra I	MTMSSEC02M (For both Hons and Gen) Marks:25 Logic and Sets		
January, 2024	18	Unit 1 i)Riemann integration: inequalities of upper and lower sums, ii)Darbaux integration, Darbaux theorem, iii)Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two Definitions. Iv)Riemann integrability of monotone and continuous functions.	Unit 1 i)Functions of several variables, ii) Limit and Continuity of functions of two or more variables iv)Partial differentiation v)Total differentiability and differentiability vi) Sufficient condition for differentiability.	Unit 1 i)Definition and examples of rings, ii)Properties of rings, iii)Subrings, iv)Integral domains v)Fields vi)Characteristic of a ring. vii)Ideal, ideal generated by a subset of a ring,	Unit 1 i)Introduction, ii)Propositions, iii)Truth table, iv)Negation, Conjunction and disjunction. Implications, bi-conditional propositions, converse, v)Contra positive and inverse propositions vi)Precedence of logical operators.	52	3
		Total number of classes=16	Total number of classes=17	Total number of classes=16	Total number of classes=3		
February, 2024	22	Unit 1 v)Properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. vi)Intermediate Value theorem for Integrals, vii)Fundamental theorem of Integral Calculus Unit-2 i)Improper integrals, ii)Convergence of Beta and Gamma functions.	Unit-1 vii) Chain rule for one and two independent parameters viii)Directional derivatives, ix)The gradient, maximal and normal property of gradient, x)tangent planes, xi)Extrema of functions of two variables, xii)Method of Lagrange multipliers, constrained optimization problems.	Unit 1 viii) Factor rings, ix) Operations on ideals, x)Prime and maximal ideals.Unit 2 i)Ring homomorphisms, ii)Properties of ring homomorphisms. iii)Isomorphism theorems I, II and III, iv)Field of quotients.	Unit 1 vii)Propositional Equivalence viii)Logical equivalences. Iii)Predicates and quantifier ix)Introduction, Quantifiers, x)Binding variables and Negations.	62	4
		Total number of classes=20	Total number of classes=18	Total number of classes=20	Total number of classes=4		
March, 2024	22	<ul> <li>Unit-3</li> <li>i) Pointwise and uniform convergence of sequence of functions.</li> <li>ii)Theorems on continuity, derivability and integrability of the limit function of a sequence of functions.</li> </ul>	Unit-2 i)Double integration over rectangular region, double integration over non- rectangular region, Double integrals in polar co- ordinates, ii)Triple integrals, Triple	Unit 3 i)Vector spaces, ii)Subspaces, iii)Algebra of subspaces, iv) Quotient spaces, v)Linear combination of vectors, linear span, linear independence,	<b>Unit 2</b> i)Sets, subsets, ii)Set operations and the laws of set theory and Venn diagrams. iii)Examples of finite and infinite sets. Finite sets and counting principle.	62	4

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		iii)Series of functions, iv)Theorems on the continuity and derivability of the sum function of a series of functions; v)Cauchy criterion for uniform convergence vi)Weierstrass M-Test.	integral over a parallelepiped and solid regions. iii)Volume by triple integrals, cylindrical and spherical coordinates. iv)Change of variables in double integrals and triple integrals.	vi) Basis and dimension, vii) Dimension of subspaces.	iv)Empty set and its properties v)Standard set operations. vi)Classes of sets. vii)Power set of a set.		
		Total number of classes=20	Total number of classes=20	Total number of classes=18	Total number of classes=4		
April, 2024	23	Unit 4 i) Fourier series ii)Definition of Fourier coefficients and series, iii) Reimann Lebesgue lemma, iv)Bessel's inequality, v) Parseval's identity, vi)Dirichlet's condition. vii) Examples of Fourier expansions and summation results for series.	Unit-3 i)Definition of vector field, ii) Divergence and Curl. iii)Line integrals, iv) Applications of line integrals: Mass and Work. v)Fundamental theorem for line integrals, vi)Conservative vector fields vii) independence of path.	Unit 4 i)Introduction to linear transformations, ii) Subspaces, dimension of subspaces, iii)null space, range, iv)Rank and nullity of a linear transformation.	Unit 3 i)Difference and Symmetric difference of two sets. ii)Set identities, Generalized union and intersections. iii)Relation: Product set. Iv)Composition of relations, v)Types of relations, vi)Partitions	62	4
		Total number of classes=22	Total number of classes=20	Total number of classes=18	Total number of classes=4		
May, 2024	22	Unit 5 i)Power series, radius of convergence, ii)Cauchy Hadamard Theorem. iii)Differentiation and integration of power series, iv) Abel's Theorem v)Weierstrass Approximation Theorem.	Unit-4 i)Green's theorem, ii)Surface integrals, iii)Integrals over parametrically defined surfaces. iv)Stokes' theorem, v)The Divergence theorem	Unit 4 i)Matrix representation of a linear transformation, ii)Algebra of linear transformations. iii) Isomorphism. Isomorphism theorems, iv) Invertibility and isomorphism, v)Change of coordinate matrix.	Unit-3 vi)Equivalence Relations with example of congruence modulo relation. vii)Partial ordering relations, viii)n- ary relations.	48	2
		Total number of classes=16	Total number of classes=14	Total number of classes=14	Total number of classes=4		
June, 2024	24	University Examinations	University Examinations	University Examinations	University Examinations		

SEMESTER-V										
	No.			Торіс	2			Class	Tuto	
Month	of Teac hing days avail able	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	MTMADSE03T Marks:50+25=7 5 Probability and Statistics	MTMSSEC01M (For both Honsand General) Marks:25 C-Programming Language.	teachí ng in hours	rial In hour s	
July, 2023	22	Unit 1 i)Partial Differential Equations ii) Basic concepts and Definitions. Iii)Mathematical Problems. First- Order Equations: Classification, iii)Construction and Geometrical Interpretation. iv)Method of Characteristics for obtaining General Solution of Quasi Linear Equations	Unit 1 i) Automorphism, ii)Inner Automorphism, iii)Automorphism groups, iv)Automorphism groups of finite and infinite cyclic groups.	Unit 1 i)Introduction to linear programming problem. Ii)Theory of simplex method, iii)Graphical solution, iv) Convex sets, v)Optimality and unboundedness, vi)The Simplex Algorithm, vii)Simplex method in tableau format, viii) Introduction to artificial variables.	Unit 1 i)Linear Diophantine equation ii)Prime counting function iii)Statement of prime number theorem, iv) Goldbach conjecture v)Linear congruences, complete set of residues.	Unit 1 i)Sample space ii)Probability axioms iii)Real randon variables (discrete and continuous), iv)Cumulative distribution function, v)Probability mass density functions vi)Mathematical expectation, vii)Moments, Momen Generating Function, viii) Characteristic function.	Unit 1 i)Basics of Computer Programming: ii)Definition, Requirement of programming language, iii)Machine language, high-level programming Languages, iv)Machine code of a program: compilation process, v)Problem solving approaches: algorithm and flowchart	72	4	
		Total no. of classes=17	Total no. of classes=17	Total no. of classes=17	Total no. of classes=17	Total no. of classes=17	Total no. of classes=4			
August, 2023	24	Unit 1 v)Canonical Forms of First-order Linear Equations. vi)Method of Separation of Variables for solving first order partial differential equations. Unit 2 i) Derivation of Heat equation, ii)Wave equation iii) Laplace equation.	Unit 1 v)Applications of factor groups to automorphism groups, vi)Characteristic subgroups, vii)Commutator subgroup and its properties.	Unit 1 ix)Two-phase method. x)Big-M method and their comparison. Unit 2 i)Duality ii) formulation of the dual problem, iii) Primal-dual relation ships, iv)economic interpretation of the dual.	Unit 1 vi)Chinese Remainder theorem, vii)Fermat's Little theorem, viii)Wilson's theorem. Unit 2 i)Number theoretic functions, ii) Sum and number of divisors, iii)Totally multiplicative functions	Unit 1 viii)Discrete distributions: Uniform, Binomial, Poisson, Geometric, Negative binomial, ix) Continuous distributions: Uniform, Normal, Exponential. Unit 2 i) Joint cumulative distribution function and its properties, ii)Joint probability density functions, iii) Marginal and conditional distributions	Unit2 i)Fundamentals of Programming: ii)Built in Data Types: int, float, double, char; iii)Constants and Variables; first program: printf(), scanf(), compilation etc., iv)Keywords, v)Arithmetic operators: precedence and associativity, v)Assignment Statements: post ⪯ increment /decrement, vi) Logical operators: and, or, not.	76	4	

		Total no. of classes=18	Total no. of classes=18	Total no. of classes=18	Total no. of classes=18	Total no. of classes=18	Total no. of classes=4		
September, 2023	22	Unit 2 iv)Classification of second order linear equations as hyperbolic, parabolic or elliptic. v)Reduction of second order Linear Equations to canonical forms. Unit 3 i) The Cauchy problem, ii)Cauchy-Kowalewskaya theorem, iii)Cauchy problem of an infinite string	Unit 2 i)Properties of externa, ii)Direct products, iii)The group of units modulo n as an external direct product, iv)Internal direct products, v)Fundamental Theorem of finite abelian groups.	Unit2 v)Transportation problem and its mathematical formulation, vi) Northwest-corner method, least cost method and Vogel approximation vii) Method for determination of starting basic solution, viii)Algorithm for solving transportation problem,	Unit 2 iv)Definition and properties of the Dirichlet product, v)The Mobius Inversion formula, vi)The greatest integer function, vii)Euler's phi-function, vii)Euler's theorem, ix)Reduced set of residues. x)Some properties of Euler's phi-function	Unit3 i)Expectation of function of two random variables, ii)Conditional expectations, iii)Independent random variables, iv)Bivariate Normal distribution, v)Correlation coefficient, vi)Joint Moment Genera ting function (jmgf) and calculation of covariance (from jmgf), vii)Linear regression for two variables.	Unit 3 i)Statements: Relational operators, if- Iterative ii)Statements: for while loop; iii)controlling and continue, nested loop.	72	4
		Total no. of classes=17	Total no. of classes=17	Total no. of classes=17	Total no. of classes=17	Total no. of classes=17	Total no. of classes=4		
October, 2023	13	Unit 4 i)Initial Boundary Value Problems. ii)Semi-Infinite String with a fixed end, iii)Semi-Infinite String with a Free end. iv)Equations with non- homogeneous boundary conditions.	Unit 3 i)Group actions, ii)Stabilizers and kernels, iii)Permutation representation associated with a give group action. iv)Applications of group actions. v)Generalized Cayley's theorem. vi)Index theorem	Unit2 ix)Assignment Problem and its mathematical formulation, x)Hungarian method for solving Assignment Problem.	Unit 3 i) Order of an integer modulo n, ii)Primitive roots for primes,	Unit 3 viii)Chebyshev's inequality, ix) Statement and interpretation of (weak) law of large numbers and strong law of large numbers.	Unit 4 i)Arrays: Definition requirement, declaration & initialization, ii) Indexing, one dim. array: iii)Finding maximum, minimum, simple sorting and searching.	39	2
		Total no. of classes=9	Total no. of classes=9	Total no. of classes=9	Total no. of classes=9	Total no. of classes=9	Total no. of classes=3		
November ,2023	11	v)Non-Homogeneous Wave Equation. vi)Method of separation of variables, vii) Solving the Vibrating String Problem. viii)Solving the Heat Conduction problem. <b>Unit 5</b>	Unit 4 i)Groups acting on themselves by conjugation, i) Class equation and Consequences, iii) conjugacy in Sn, p-groups.	Unit 3 i)Game theory ii)Formulation of two person zero sum games.	Unit 3 iii)Composite numbers having primitive roots, iv)Euler's criterion v)The Legendre symbol and its properties.	Unit 3 x)Central Limit theorem for independent and identically distributed RV with finite variance, xi)Markov Chains,	Unit5i)Multi-dimensionalarraysii)MatrixManipulations(Addition,Multiplication,Transpose)i i i ) Arraysand	38	2

		i) Central force.				xii)Chapman- Kolmogorov equations, xiii)Classification of States.	Pointers, iv)Memory location and deallocation: v) <i>malloc ()</i> and <i>free()</i> functions		
		Total no. of classes=9	Total no. of classes=9	Total no. of classes=9	Total no. of classes=9	Total no. of classes=9	Total no. of classes=2		
December ,2023	20	Unit 5 ii)Constrained motion, iii) Varying mass, iv)Tangent and Normal components of acceleration, v)Modelling Ballistics vi)Planetary Motion and Kepler's second law.	Unit 4: iv)Sylow's theorems and consequences, v)Cauchy's theorem, vi)Simplicity of An for n ≥ 5 vii) Non-simplicity tests.	Unit 3 iii)Solving two person zerosum games, iv) G ames with mixedstrategies, v)Graphical solution procedure, vi) Linear programming solution of Games.	Unit 3 vi)Quadratic reciprocity, vii)Quadratic congruence with composite moduli, viii) Public Key Encryption, ix)RSA encryption and decryption, x) The equation $x^2 + y^2 = z^2$ , xi)Fermat's Last theorem	Unit 4 i)Random Samples, ii)Sampling Distributions iii)Estimation of parameters, iv)Testing of hypothesis.	Unit6 Functions: i)Why?, How to declare, define and invoke a function, Variables' scope, local global variables and function parameters, ii)Pointers, arrays as function parameters, <i>return</i> statement, iii) Header files and their role iv)Illustrate different examples like swapping values, compute n!, nCr, find max/min from a list of elements, sort a set of numbers, v)matrix addition	47	2
		Total no. of classes=12	Total no. of classes=12	Total no.of classes=10	Total no. of classes=10	Total no. of classes=10	Total no. of classes=3		

				S	EMESTER-VI			Class	Tuto
	No.			Тор	pic			teac hing	rial In
Month	of Teac hing days avail able	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	MTMADSE05T Marks:50+25=75 Boolean Algebra and Automata Theory	MTMADSE06T Marks:50+25=75 Mechanics	MTMSSEC02M (For both Hons and Gen) Marks:25 Logic and Sets	in hour s	hour s
January, 2024	18	Unit-1 Metric spaces i)Definition and examples. ii)Open and closed balls, neighborhoods, open set, interior of a set. iii)Limit point of a set, closed set, iv)Diameter of a set, v)Subspaces, v) Dense sets, vii)Separable spaces. viii)Sequences in Metric Spaces, ix)Cauchy sequences. x)Complete Metric Spaces, viiCantor's theorem	Unit 1 i)Polynomial rings over commutative rings, ii)Division Algorithm and consequences, iii) Principal Ideal Domains.	Unit 1 i)General properties of polynomials, ii)Graphical represent tation of a polynomial, iii)Maximum and minimum values of a polynomials, iv)General proper ties of equations, v)Descartes's rule of signs positive and negative rule.	<ul> <li>Unit 1 <ul> <li>i)Definition,</li> <li>ii)Examples and basic properties of ordered sets,</li> <li>iii)Maps between ordered sets,</li> <li>iv)Duality principle,</li> </ul> </li> <li>v) Lattices as ordered sets, lattices as algebraic structures, vi)Sublattices,</li> <li>vii) Products and homomorphism.</li> </ul>	Unit 1 i)Co-planar forces. ii)Astatic equilibrium. iii)Friction. iv)Equilibrium of a particle on a rough curve. v)Virtual work.	Unit 1 i)Introduction, ii) Propositions, iii)Truth table, negation, conjunction and disjunction. iv) Implications, bi- conditional propositions, v) Converse, contra positive and inverse propositions vi) Precedence of logical operators.	63	3
		Total no. of classes=16	Total no. of classes=14	Total no. of classes=15	Total no. of classes=15	Total no. of classes=15	Total no. ofclasses=3		
February, 2024	22	Unit 2 i)Continuous Mappings, ii) Sequential criterion and other characterizations of continuity, iii)Uniform Continuity, iv) Connectedness, v)Connected subsets of R. vi)Compactness vii)Sequential compactness, viii)Heine-Borel property, ix)Totally bounded spaces, x)Finite intersection property, and continuous functions on compact sets. xi)Homeomorphism, xii) Contraction	Unit1 iv)Factorization of polynomials, v)Reducibility tests, vi)Irreducibility tests, vii)Eisenstein criterion, viii)Unique factorization in Z ix)Divisibility in Integral Domains x) Irreducible, xi)Prime Unique Factorization Domains, xii)Euclidean Domains.	Unit1 vi) Relation between the roots and the coefficients of equations. Unit 2 i)Symmetric functions. Ii)Applications of symmetric function of the roots.	Unit 2 i)Definition, examples and properties of modular and distributive lattices, ii) Boolean Algebras, iii) Boolean Polynomials, iv) Minimal and maximal forms of Boolean polynomials.	Unit 1 vi)Forces in three dimensions. vii)General conditions of equilibrium. viii)Centre of gravity for different bodies. ix)Stable and unstable equilibrium.	Unit 1 vii)Propositional Equivalence viii)Logical equivalences. ix)Predicates and quantifiers x)Introduction, xi)Quantifiers, xii)Binding variables and Negations.	72	3

		mappings, xiii) Banach Fixed Point Theorem and its application to ordinary differential equation. <b>Unit 3</b> <b>Complex Analysis</b> i)Limits, ii)Limits involving the point at infinity, iii) Continuity. iv)Properties of complex numbers.							
		Total no. of classes=18	Total no. of classes=18	Total no. of classes=16	Total no. of classes=16	Total no. of classes=16	Total no. of classes=4		
March, 2024	22	Unit 3 Complex Analysis v)Regions in the complex plane, vi)Functions of complex variable, vii)Mappings. viii)Derivatives, differentiation formulas, ix)Cauchy-Riemann equations, x)Sufficient conditions for differentiability. Unit 4 i)Analytic functions, ii)Examples of analytic functions, iii)Exponential function, iiv)Logarithmic function	Unit 2 i)Dual spaces, dual basis, ii)Double dual, iii)Transpose of a linear transformation and its matrix in the dual basis, iv)Annihilators.	Unit 2 iii) Transformation of equations. iv)Solutions of reciprocal and binomial equations. v)Algebraic solutions of the cubic (Cardan's method) and biquadratic (Ferrari's method). vi)Properties of the derived functions.	Unit 2 v)Quinn-McCluskey method, vi)Karnaugh diagrams, vii)Logic Gates, viii)Switching circuits and applications of switching circuits. Unit 3 i)Introduction: ii)Alphabets, strings, and languages. iii) Finite Automata and Regular Languages iv)Deterministic and non-deterministic finite automata, v)Regular Expressions.	Unit 2 i)Equations of motion referred to a set of rotating axes. ii)Motion of a projectile in a resisting medium. iii)Stability of nearly circular orbits. iv)Motion under the inverse square law.	Unit 2 i)Sets, subsets, ii)Set operations and the laws of set theory and Venn diagrams. iii)Examples of finite and infinite sets. Finite sets and counting principle. iv)Empty set and its properties v)Standard set operations. vi)Classes of sets. vii)Power set of a set.	72	4
		Total no. of classes=18	Total no. of classes=18	Total no. of classes=16	Total no. of classes=16	Total no. of classes=16	Total no. of classes=4		
April, 2024	23	Unit 4 v)Trigonometric function, vi) Derivatives of functions, vii)Definite integrals of functions. Contours, viii) Contour integrals and its examples, ix)Upper bounds for moduli of contour integrals. x)Cauchy- Goursat theorem, xi)Cauchy integral	Unit 2 v)Eigen spaces of a linear operator, vi)Diagonalizability, vii)Invariant subspaces viii)Cayley-Hamilton theorem, ix)The minimal polynomial for a linear operator, x)Canonical forms. Unit 3 i)Inner product spaces	Unit 3 i)Symmetric functions of the roots, ii)Newton's theorem on the sums of powers of roots, iii)Homogeneous products, iv)Limits of the roots of equations.	Unit 3 vi)Regular languages and their relationship with finite automata, vii) Pumping lemma and closure properties of regular languages. Unit 4 i)Context Free Grammars and Pushdown Automata ii) Context free grammars (CFG), iii)Parse trees,	Unit 2 v)Slightly disturbed orbits. vi)Motion of artificial satellites. vii)Motion of a particle in three dimensions. viii)Motion on a smooth sphere, cone, and on any surface of revolution. Unit 3 i) Degrees of freedom.	Unit 3 i)Difference and Symmetric difference of two sets. ii)Set identities, Generalized union and intersections. iii)Relation: Product set. Iv)Composition of relations, v)Types of relations, vi)Partitions	72	4

formula. <b>Unit 5</b> i) Liouville's theorem ii) The Fundamental theorem of Algebra.	ii)Norms iii)Gram- Schmidt orthogonalisation process.		iv)Ambiguities in grammars and languages. v)Pushdown automaton (PDA) and the language accepted by PDA, vi)Deterministic PDA, vii)Non- deterministic PDA, viii)Properties of context free languages;	ii)Moments and Products of inertia.		
Total no. of classes=18	Total no. of classes=18	Total no. of classes=16	Total no. of classes=16	Total no. of classes=16	Total no. of classes=4	

May, 2024	22	Unit 5 iii)Convergence of sequences and series, iv)Taylor series and its examples. Unit 6 i)Laurent series and its examples, ii) Absolute and Uniform convergence of power series.	Unit 3 iv)Orthogonal complements, v)Bessel's inequality, vi)The adjoint of a linear operator, vii)Least Squares Approximation. Unit 4 i) Minimal solutions to systems of linear equations, ii)Normal and self-adjoint Operators, iii)Orthogonal Projections iv)Spectral theorem.	Unit 4 i)Separation of the roots of equations, ii)Strums theorem. iii)Applications of Strum's theorem, iv)Conditions for reality of the roots of an equation. v)Solution of numerical equations.	Unit 4 ix) Normal forms, x)Pumping Lemma, xi) Closure properties, xii) Decision properties. Unit 5 i) Turing Machines ii)Turing machine as a model of computation. iii)Programming with a Turing machine, iv) Variants of Turing machine and their equivalence. Unit 6 i) Undecidability: Recursively enumerable and recursive languages, ii)undecidable problems about Turing machines iii) Halting problem. iv)Post Correspondence Problem, v)Undecidability problems about CFGs.	Unit 3 iii)Momental Ellipsoid. iv)Principal axes. v)D Alembert's Principle. vi)Motion about a fixed axis. vii)Compound pendulum. viii) Motion of a rigid body in two dimensions under finite and impulsive forces. ix)Conservation of momentum and energy.	Unit-3 vi)Equivalence Relations with example of congruence modulo relation. vii)Partial ordering relations, viii)n- ary relations.	72	4
		Total no. of classes=18	Total no. of classes=18	Total no. of classes=16	Total no. of classes=16	Total no. of classes=16	Total no. of classes=4		
June, 2024	24	University Examinations	University Examinations	University Examinations	University Examinations	University Examinations	University Examinations		

Dinabandhu Mahavidyalaya Department of Mathematics Lesson Plan General Course Session: 2023-2024 NEP-2020( Semester: I-II) under West Bengal State University

## Dinabandhu Mahavidyalaya, Bongaon. Lesson Plan, 2023-2024, Department of Mathematics NEP-2020 under West Bengal State University General Course

Month	No. of	SEMESTER-I JULY,23 -DEC,23	Class	Tutorial
	Teaching	Course type: Minor, Course Code: MA-1	teaching	in hours
	days	Credit Pattern (L:T:P)= 4.:1:0 ,Marks =100, Credit =5	in hours	
	available	Topic: Algebra		
July,2023	22	<ul> <li>Unit -1: Classical Algebra</li> <li>Complex Numbers</li> <li>i) De-Moivre's theorem for integer and rational indices,</li> <li>ii) The n-th roots of unity,</li> <li>iii) Definitions of exponential and trigonometrical functions of a complex variable,</li> <li>iv) Logarithm of a complex number and its properties.</li> <li>v) Definitions of a<sup>z</sup>,</li> <li>vi) Inverse circular functions,</li> <li>vii) Hyperbolic functions.</li> </ul>	12	1
August,2023	24	Unit -1: Classical Algebra Theory of Equations i)Relation between roots and coefficients, ii)Transformation of equation, iii)Equation of squared differences of a cubic, iv) Reciprocal equations, v) Binomial equations and their properties, vi)Descartes' rule of signs, vii)Upper bounds for the real roots, vii)Upper bounds for the real roots, viii)Cardan's solution of the cubic, ix)The nature of the roots of the cubic x) Ferrari's methods of solution of biguadratic equations.	14	1
September, 2023	22	Unit -1: Classical Algebra Inequalities i) $AM \ge GM \ge HM$ , ii)Extreme values of sum and product, iii) Cauchy's inequality, iv) m-th power theorem. Unit - 2: Abstract Algebra i)Equivalence relations and Partitions, ii)Functions,	14	1

		<ul> <li>iii) Invertible functions, One to one correspondence and cardinality of a set,</li> <li>iv)Permutations, Inversions, Cycles and Transpositions.</li> <li>v) Groups, abelian and non-abelian groups</li> <li>vi) The groups Zn ,U(n),</li> <li>vii) Groups of symmetries of an equilateral triangle,</li> <li>viii) Permutation group S<sub>3</sub> ,the general linear group GL(n, R), n ≤ 3.</li> </ul>		
October,2023	13	Unit – 2 : Abstract Algebra ix)Subgroups, x) Cyclic subgroups, xi)Cosets, Index of subgroup, xii)Lagrange's theorem and its converse, xiii) Order of an element, xiv) Normal subgroups.	8	1
November,2023	11	Unit – 2 : Abstract Algebra xv) Rings, commutative and non-commutative rings xvi) Zn, the ring of integers modulo n xvii) Polynomial rings xviii)Subrings, xix) Integral Domains, xx) Skew-fields, fields and subfields. Unit – 3 : Linear Algebra i)Matrix of real and complex numbers, ii)Algebra of matrices, iii) Symmetric and Skew Symmetric matrices, iv)Hermitian and Skew- Hermitian matrices, v)Orthogonal and Unitary matrices.	8	1
December,2023	20	<pre>Unit - 3 : Linear Algebra vi)Determinants, vii)Laplace expansions, viii)cofactors, Adjoint, ix)inverse of a matrix, x)Cramer`s Rule, xi) Vector space, xii) Linearly dependent and independent set Basis, Dimension, xiii) Linearly dependent and their elementary properties, xiv)Matrix representation of Linear Transformation. xv)Rank of a matrix xvi)System of linear equations in matrix form AX = B; Consistency and inconsistency xvii)Solving linear systems using Gaussian elimination.</pre>	14	1

xviii)Eigenvalues, Eigenvectors, Eigen-space, xix)Diagonalization of matrices, xx)Characteristic polynomial of a matrix, xxi)Cayley-Hamilton theorem and its application for determining inverse of square matrix, xxii)Bilinear forms, xxii)Bilinear forms, xxiii)Real Quadratic Forms xxiv)Sylvester`s law of inertia, Positive Definiteness.	
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Month	No. of	SEMESTER-II JAN-JUNE	Class	Tutorial
	Teaching	Course type: Minor , Course Code: MA-2	teaching	in hours
	days	Credit Pattern (L:T:P)= 4.:1:0,Marks =100, Credit =5	in hours	
	avallable			
January,		i)Limit of a function,	12	1
2024	10	ii) $\varepsilon = \delta$ definition of a limit iii) Infinite limits.		-
	18	iv)Continuity and types of discontinuities		
		v)Differentiability of a function, vi)Relation between differentiability and continuity		
		Unit – 1 : Limits, Continuity and Differentiability		
February,	22	vii)Successive differentiation,	14	1
2024	22	viii) Leibnitz theorem, its applications to different functions	14	-
		ix)Partial differentiation,		
		x) Euler's theorem on homogeneous functions and its converse.		
		i)Rolle's theorem.		
		ii)Lagrange's Mean Value Theorem,		
		iii)Cauchy's Mean Value Theorem,		
		iv)Geometrical interpretation of MVTs,	11	1
March,	22	v)Taylor's theorem,	14	T
2024	22	vii)Maclaurin's series expansions of $e^x$ , sin x, cos x, log $(1 + x)$ , $(1 + x)^m$		
		viii) Indeterminate forms.		
		Unit -3 : Integral Calculus		
		i)Integration of rational and irrational functions,		
		ii)Special integrals		
		iv)Reduction formulae for the integration of $\sin^n x$ , $\cos^n x$ , $\tan^n x$ , $\sec^n x$ , $(\log x)^n$ , $\sin^n x \cos^m x$		
		v)Improper Integrals,		
		vi)Beta and Gamma functions		
		Unit – 4: Applications		
	22	ii)Curvature,		
April_2024	25	iii) Asymptotes,		_
		iv)Envelopes,	14	T
		v)Maxima and Minima,		
		vijeončavity and convexity,		

		vii)Points of inflexion.		
May, 2024	22	<ul> <li>Unit - 4: Applications</li> <li>viii)Tracing of Cartesian and Polar curves,</li> <li>ix) Length of plane curve,</li> <li>x)Area bounded by plane curves,</li> <li>xi)Volume and Surface area of solids of revolution.</li> <li>Graphical Demonstration (Teaching Aid)</li> <li>i)Plotting of graphs of function e <sup>ax+b</sup>, log(ax + b), 1/(ax + b), sin(ax + b), cos (ax + b),  ax + b </li> <li>ii)Plotting the graphs of polynomial of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.</li> <li>iii) Sketching parametric curves.</li> <li>iv) Obtaining volume and surface of revolution of curves.</li> <li>v) Tracing of conics in Cartesian coordinates/polar coordinates.</li> </ul>	14	1
June,2024	24	University Examinations		

Dinabandhu Mahavidyalaya Department of Mathematics Lesson Plan General Course Session: 2023-2024 CBCS( Semester: III-VI) under West Bengal State University

		SEMESTER-III	SEMESTER-V		
Month	No. of Teaching days available	Topic MTMGCOR03T Marks:50+25=75 Real Analysis	Topic MTMGDSE01T Marks:50+25=75 Matrices	Class teaching in hours	Tutorial In hours
July,2023	22	<ul> <li>i)Finite and infinite sets with examples of countable and uncountable sets.</li> <li>Ii)Real line, bounded sets, suprema and infima,</li> <li>iii)completeness property of R,</li> <li>iv)Archimedean property of R,</li> <li>v)intervals.</li> <li>vi)Concept of cluster points and statement of Bolzano- Weierstrass theorem.</li> </ul>	<ul> <li>i)R, R2, R3 as vector spaces over R.</li> <li>ii)Standard basis for each of them.</li> <li>iii)Concept of Linear Independence and examples of different bases.</li> <li>iv)Subspaces of R2, R3.</li> </ul>	Sem3=12 Sem 5=12	Sem3=2 Sem 5=2
		Total number of classes=12	Total number of classes=12		
August,2023	24	vii)RealSequence,viii)Bounded sequence,ix)Cauchy convergencecriterionforsequences.x)Cauchy's theorem on limits,xi) Sandwich theoremxii)Monotonesequencesand theirconvergence	v)Translation, Dilation, Rotation, vi)Reflection in a point, line and plane. vii)Matrix form of basic geometric transformations. viii) Interpretation of eigenvalues and eigenvectors for such transformations and Eigen spaces as invariant subspaces	Sem3=12 Sem 5=12	Sem3=2 Sem 5=2
		Total number of classes=12	Total number of classes=12		
September,202 3	22	<ul> <li>xiii)Infinite series</li> <li>xiv)Cauchy convergence criterion for series,</li> <li>xv) Positive term series, Geometric series,</li> <li>xvi) Comparison test,</li> <li>xvii) Convergence of p- series,</li> <li>xviii) Root test, Ratio test,</li> <li>x i x ) Alternating series, Leibnitz's test,</li> <li>xx) Absolute and Conditional Convergence.</li> </ul>	<ul> <li>ix)Types of matrices.</li> <li>x)Rank of a matrix.</li> <li>xi)Invariance of rank under elementary transformations.</li> <li>xii)Reduction to normal form,</li> <li>xiii)Solutions of linear homogeneous and non-homogeneous equations(n ≤4).</li> </ul>	Sem3=12 Sem 5=12	Sem3=2 Sem 5=2
		Total number of classes=12	Total number of classes=12		
October,2023	13	xxi) Sequences of functions.	xiv)Matrices in diagonal form, xv)Reduction to diagonal form up to matrices of order 3.	Sem3=6 Sem 5=6	Sem3=1 Sem 5=1
		Total number of classes=6	Total number of classes=6		
November,202 3	11	<ul><li>xxii)Series of functions,</li><li>xxiii) Point-wise and uniform convergence.</li><li>xxiv) Mn-test, ,M-test.</li></ul>	xvi)Computation of matrix inverses using elementary row operations xvii)Rank of matrix	Sem3=5 Sem 5=5	Sem 3=1 Sem 5=1

		Total number of classes=5	Total number of classes=5		
December,2023	20	xxv) Uniform convergence and results about integrability and differentiability xxvi)Power series and radius of convergence.	xviii)Solutions of a system of linear equations using matrices. xix)Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.	Sem3=8 Sem 5=4	Sem3=1 Sem 5=1
		Total number of classes=8	Total number of classes=4		

SEMESTER-IV			SEMESTER-VI		
Month	No. of Teaching days available	Topic MTMGCOR04T Marks:50+25=75 Algebra	Topic MTMGDSE03T Marks:50+25=75 Numerical Methods	Class teaching in hours	Tutorial In hours
January,2024	18	<ul> <li>i) Equivalence Relations and Partitions,</li> <li>ii)Functions, Composition of functions,</li> <li>Invertible functions, One to one correspondence and cardinality of a set.</li> <li>iii)Groups, Abelian and Non-Abelian Groups,</li> <li>iv)The groups Zn ,U(n).</li> <li>Total number of classes=12</li> </ul>	<ul> <li>i)Algorithms,</li> <li>ii)Convergence,</li> <li>iii)Bisection method,</li> <li>iv)False position method,</li> <li>v)Fixed point iteration method,</li> <li>vi)Newton's method,</li> </ul>	Sem4=12 Sem 6=12	Sem4=2 Sem 6=2
February,2024	22	<ul> <li>v)Cyclic Group,</li> <li>vi)Complex roots of unity, Circle Group,</li> <li>vii)The general linear group GLn(n,R),</li> <li>viii) Groups of symmetries of (a) an isosceles</li> <li>triangle, (b) an equilateral triangle,(c) a</li> <li>rectangle, and (d) a square.</li> <li>Total number of classes=12</li> </ul>	vii)Secant method, viii)LU decomposition, ix) Gauss-Jacobi, x)Gauss-Siedel xi)SOR iterative methods.	Sem4=10 Sem 6=10	Sem4=2 Sem 6=2
March,2024	22	<ul> <li>ix) Permutation group S n,</li> <li>x)Group of Quaternions.</li> <li>xi) Subgroups, cyclic subgroups,</li> <li>xii) Commutator subgroup of group,</li> <li>xiii)Examples of subgroups including the center of a group.</li> <li>xiv)Cosets, Index of subgroup,</li> <li>xv)Lagrange's theorem,</li> <li>xvi)Order of an element,</li> <li>xvii)Normal subgroups,</li> <li>xviii) Quotient groups.</li> </ul>	xii)Lagrange and Newton interpolation: linear and higher order, xiii) finite difference operators.	Sem4=12 Sem 6=12	Sem4=2 Sem 6=2
		Total number of classes=12	Total number of classes=12		
April,2024	23	xix)Rings, xx) Examples of Commutative and Non- Commutative Rings xxi) Rings from number systems, xxii) Zn the ring of integers modulo n, xxiii)Ring of Real Quaternions, xxiv) Rings of Matrices, xxv)Polynomial rings, xxvi) Rings of Continuous Functions.	xiv)Numerical differentiation: xv) Forward difference, backward difference and central Difference.	Sem4=10 Sem 6=10	Sem4=2 2 Sem 6=2 2
		Total number of classes=10	Total number of classes=10		

May,2024	22	xxiv)Subrings xxv) Ideals, xxvi)Integral domains xxvii) Fields, xxviii) Examples of fields: Zp, Q, R, and C. Total number of classes=8	<ul> <li>xvi) Numerical Integration</li> <li>a) Trapezoidal rule,</li> <li>b)Simpson's rule,</li> <li>xvii) Euler's method for solving ordinary differential equations.</li> <li>Total number of classes=8</li> </ul>	Sem4=8 Sem 6=8	Sem4=1 Sem 6=1
June,2024	24	University Examinations	University Examinations		