Teaching Plan for Academic Session: 2025-26

Department of Mathematics

Jagannath Barooah College (Autonomous), Jorhat

Name of the Teacher: Mr. Gourangajit Borah

Semester: ODD & EVEN

Class/Semester	Title & Code of The Paper Allotted (Credit)	Method of Teaching	Teaching Material	Unit	Period/ Hours Required	Details of the Contents	Remarks / Books
UG Sem I (Odd)	Basic Analysis and Algebra (MTHMJ-011) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	I	15	Polynomial, Polynomial Equations, General properties of equations, Relation between roots and co-efficient, Descarte's rule of change of sign, Transformation of Equations, Cubic equation, Cardon method, Biquadratic equation.	Ram Krishna Ghosh, Kantish Chandra Maity, *Higher Algebra: [Classical and Abstract],* New Central Book Agency, 6th revised edition.
UG Sem I (Odd)	Basic Analysis and Algebra (MTHMI-011) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	I	15	Polynomial, Polynomial Equations, General properties of equations, Relation between roots	Ram Krishna Ghosh, Kantish Chandra Maity, *Higher Algebra: [Classical*

						and co-efficient, Descarte's rule of change of sign, Transformation of Equations, Cubic equation, Cardon method, Biquadratic equation.	*and Abstract],* New Central Book Agency, 6th revised edition.
UG Sem II (Even)	Calculus & ODE (MTHMJ-021) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	II	12	Successive differentiation, Leibnitz's theorem and its applications, Indeterminate forms. Partial Derivatives, Euler's theorem on homogeneous function.	B. C. Das and B. N. Mukherjee, *Higher Trigonometry,* U. N. Dhur & Sons Pvt. Ltd., 34th edition.
UG Sem II (Even)	Calculus & ODE (MTHMI-021) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	II	12	Successive differentiation, Leibnitz's theorem and its applications, Indeterminate forms. Partial Derivatives, Euler's theorem on homogeneous function.	B. C. Das and B. N. Mukherjee, *Higher Trigonometry,* U. N. Dhur & Sons Pvt. Ltd., 34th edition.
UG Sem III (Odd)	Differential Equations-I (MTHMJ-031) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	II, III	28	Introduction to compartmental model, exponential decay model, lake pollution model (case study of Lake Burley Griffin), drug assimilation into the blood (case of a single cold pill, case of a course of cold pills), exponential growth of population,	S. L. Ross, *Differential Equations,* 3rd Ed., John Wiley and Sons, India, 2004.

						limited growth of population, limited growth with harvesting, Equilibrium points, Interpretation of the phase plane, predatory-prey model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.	
UG Sem III (Odd)	Discrete Mathematics (MTHMI-031) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	III	20	Boolean Algebra: Boolean algebra as lattice and an algebraic system, Properties of Boolean algebra, Sub-algebra and Homomorphism of Boolean algebra, Boolean Algebra as Lattices, Boolean functions, Conjunctive and Disjunctive Normal Form.	S. Lipschutz & M. L. Lipson, *Discrete Mathematics*, Schaum outline series, Tata McGraw Hill.
UG Sem IV (Even)	Ring Theory and Linear Algebra-I (MTHMJ-044) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	III, IV, V	48	Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces, Linear transformations, null space, range, rank and nullity of a linear	J. A. Gallian, *Contemporary Abstract Algebra*, 4th Ed., Narosa Publishing House, New Delhi, 1999.

						transformation, Matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms, Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.	
UG Sem V (Odd)	Number Theory (MTHD-501) (6 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	III	23	Order of an integer modulo n, primitive roots for primes, composite numbers having primitive roots, Euler's criterion, the Legendre symbol and its properties, quadratic reciprocity, quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.	David M. Burton, *Elementary Number Theory,* 6th Ed., Tata McGraw-Hill, Indian reprint, 2007.
UG Sem VI (Even)	Metric Spaces and Complex Analysis (MTHC-601) (6 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	V, VI	14	Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples, Laurent series and its examples, absolute and uniform	S. Kumaresan, *Topology of Metric Spaces*, 2nd Ed., Narosa Publishing House, 2011.

						convergence of power series.	
	Linear Programming (MTHD-601) (6 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	IV, V	33	Transportation Problem: Definition, Transportation Table, Loops in transportation tables and their properties, Determination of an initial basic feasible solution by North West corner method, Matrix minima or least cost method and Vogel approximation method, unbalanced transportation problem, optimization by Modi method, Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.	*Linear Programming and Game Theory;* Dipak Chatterjee, Prentice Hall of India (P) Ltd.
PG Sem I (Odd)	Algebra (PMTHC-102) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	I, II, III	30	Direct product and Direct sums of Groups. Decomposable groups. Normal and Subnormal series of groups, composition series,	S. Singh and Q. Zameruddin, Modern Algebra, Vikash Publishing House, 2006.

						Jordan Holder theorem, solvable groups, Divisibility in commutative rings, PID, UFD and their properties, Eisentein's irreducibility criterion, Field theory – Extensions of fields. Algebraic and Transcendental elements, Algebraic extensions of Splitting field perfect Fields, Finite field (Moore's theorem etc.), Construction by ruler and compass, elements of Galois theory.	
PG Sem II (Even)	Complex Analysis (PMTHC-201) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	IV, V	15	Analytic functions as mappings: Isogonal and Conformal Transformation, Necessary and sufficient condition of conformal transformation, Bilinear transformations, Geometrical inversion, Invariance of cross ratio, Fixed points of a bilinear transformation, some special bilinear transformation eg.real axis on itself, unit circle	M.R. Spiegel, Complex Variables. Schaum's Outlines series, McGraw Hill Education, 2017.

						on itself, real axis on unit circle etc.Branch point and Branch line, Concept of the Riemann surface, Analytical continuation, Schwarz's reflection principle, Infinite products, Gamma Function and its properties.	
PG Sem III (Odd)	Number Theory (PMTHC-301) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	I, II	20	Quadratic residues: Euler's criterion, Legendre's symbol and its properties, Quadratic Reciprocity Law, Quadratic congruences with composite moduli, Fibonacci numbers: certain identities involving Fibonacci numbers, Continued fractions, Pell's equation, Farey sequence.	G.E. Andrews, Number Theory (Unit 4), Dover Publications, 2012.
PG Sem IV (Even)	Mathematical Methods (PMTHC-403) (4 Cr.)	Lecture, Discussion, PPT	Textbook, Diagrams, Chalk & Talk	II, IV	17	Integral equations: Linear integral equations of the first and second kind of Fredholm and Volterra type, solution by successive substitutions and successive approximations, solution of equations with separable kernels. Fredholm alternative,	A.S. Gupta, *Calculus of Variations with Applications* (Prentice Hall of India, New Delhi 2003).

						Game theory: Two-person zero-sum games, maximum criterion, dominance rules, mixed strategies, mini-max theorem, solutions of 2x2 and 2xm games.	