Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Differential Calculus (MATH101TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	**1 - 4**	**Unit-I:** Limit and Continuity (epsilon & delta definition). Types of discontinuities, Differentiability of functions.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** H.Anton, I. Birens& S. Davis, Calculus, John Wiley & Sons, Inc., 2002.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	**1**	Successive differentiation, Leibnitz's Theorem		
	2 - 4	**Unit-II:** Indeterminate forms, Rolle's Theorem, Lagrange's and Cauchy's Mean Value Theorems		
September	**1 - 3**	Taylor's theorem with Lagrange's and Cauchy's form of remainder, Taylor's series, Maclaurin's series	**2.** G.B. Thomas & R.L. Finney, Calculus, Pearson Education, 2017. **3.** T.M. Apostol, Calculus, Vol.-1, John Wiley &Sons, 2002.	
	4	**Unit -III:** Concavity, Convexity and Points of inflexion.		
October	**1 - 4**	Curvature, Radius of Curvature, Centre of Curvature, Asymptotes, Singular points, Double points, Polar coordinates, Relation between Cartesian and Polar Coordinates.		
November	**1 - 4**	**Unit -IV:** Functions of several variables, Partial differentiation, Euler's Theorem on homogeneous functions		
December	**1 - 4**	Maxima and Minima of functions of several variables.		
February	**1 - 2**	Maxima and Minima with Lagrange multiplies method, Jacobians		
	2 -4	Revision,		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Differential Equations (MATH102TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	1 - 4	**Unit-I:** Basic theory of linear differential equations, Wronskian. First order exact differential equations. Integrating factors and rule to find integrating factor.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** Sheply L., Ross Differential Equations, 3rd Ed., John Wiley & Sons, 1984. **2.**I. Sneddon, Elements of Partial Differential Equations, MacGraw Hill International Edition, 1967.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	1	First order higher differential equations solvable for x, y, p, Clairut's form		
	2 - 4	**Unit-II:** Methods of solving higher-order differential equations. Solving a differential equation by reducing its order.		
September	1 - 2	Linear homogenous equations with constant coefficients, Linear non-homogenous equations.		
	3-4	**Unit -III:** The method of variation of parameters with constant coefficients.		
October	1 - 4	The Cauchy-Euler equation and Legendre equation. Simultaneous differential equations, Total differential equations. .		
November	1 - 2	**Unit- IV:** Order and degree of partial differential equations, Formation of first order partial differential equations.		
	2 - 4	Linear partial differential equations of first order,		
December	1 - 4	Lagrange's method and Classification of second order partial differential equations and Revision		
February	1 - 4	Revision,		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Transportation & Game Theory (MATH317TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	1 - 4	**Unit-I:** Transportation Problem and its mathematical formulation, northwest corner method, least cost method	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** Mokhtar S. Bazaraa, John J. Javis and Hanif D. Sherali, Linear Programming and NetworkFlows, 2nd Ed., John Wiley & Sons, India, 2004. **2.** Hamdy A. Taha, Operational Research, An Introduction, 8th Ed., Prentice – Hall India, 2006. **3.** F.S. Hillier and G.J. Lieberman, Introduction to Operational Research, 9th Ed., Tata McGraw Hill, Singapore, 2009.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	1 - 4	**Unit-II:** Vogel approximation method for determination of starting basic solution,		
September	1	Algorithm for solving transportation problem		
	2 - 4	**Unit -III:** Assignment problem and its mathematical formulation.		
October	1 - 2	Hungarian method for solving assignment problem.		
	3 - 4	**Unit -IV:** Game theory, Formulation of two-person zero sum game.		
November	1 - 4	Solving two-person zero sum games with mixed strategies,		
December	1 - 4	Graphical solution procedure. Revision		
February	1 - 4	Revision,		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Real Analysis (MATH201TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	**1 - 4**	**Unit-I:** Limit and Continuity (epsilon & delta definition). Types of discontinuities, Differentiability of functions.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** E. Fischer, Intermediate Real analysis, Springer, 1983.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	**1**	Successive differentiation, Leibnitz's Theorem		
	2 - 4	**Unit-II:** Indeterminate forms, Rolle's Theorem, Lagrange's and Cauchy's Mean Value Theorems	**2.** R.G. Bartle and D.R. Sherbert, Introduction to Real Analysis, John Wiley and Sons (Asia) P. Ltd., 2000	
September	**1 - 3**	Taylor's theorem with Lagrange's and Cauchy's form of remainder, Taylor's series, Maclaurin's series		
	4	**Unit -III:** Concavity, Convexity and Points of inflexion.	**3.**K.A. Ross, Elementary Analysis – The Theory of Calculus Series – Undergraduate Texts in Mathematics, Springer Verlag, 2003	
October	**1 - 4**	Curvature, Radius of Curvature, Centre of Curvature, Asymptotes, Singular points, Double points, Polar coordinates, Relation between Cartesian and Polar Coordinates.		
November	**1 - 4**	**Unit -IV:** Functions of several variables, Partial differentiation, Euler's Theorem on homogeneous functions	**4.**T.M. Apostol, Calculus, Vol.-1, John Wiley &Sons, 2002.	
December	**1 - 4**	Maxima and Minima of functions of several variables.		
February	**1 - 2**	Maxima and Minima with Lagrange multiplies method, Jacobians		
	2 -4	Revision,		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Matrices (MATH301TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	1 - 4	**Unit-I:** Types of matrices, Rank of matrix, Invariance of rank under elementary transformations, Reduction to normal form,	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** A.I. Kostrikin, Introduction to Algebra, Springer Verlag, 1984.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	1	Solution of linear homogeneous and non-homogeneous equations.		
	2 - 4	**Unit-II:** Matrices in diagonal form, Reduction to diagonal form, Computation of matrix inverses using elementary row operations.	**2.** S.H. Friedberg, A.L.Isel and L.E.Spence, Linear Algerbra, Prentice Hall of India Pvt., Ltd., New Delhi, 2004.	
September	1 - 2	Rank of matrix. Solution of a system of linear equations using matrices. Illustrative examples of above concepts from geometry, physics, chemistry etc.		
	3 - 4	**Unit -III:** Definition of Vector space, R,R2, R3, as vector spaces over R,	**3.** Richard Bronson, Theory and Problems of Matrix Operators, Tata McGraw Hill,1989.	
October	1 - 4	Concept of Linear dependence/Independence, Standard basis for R,R2, R3, Examples of different bases, Subspaces of R2, R3.		
November	1 - 4	**Unit -IV:** Translation, Dilation, Rotation, Reflection in a point, line and plane, Matrix of basic geometric transformations.		
December	1 - 4	Interpretation of eigenvalues and eigenvectors for such transformations and eigenspaces as invariant subspaces.		
February	1 - 2	Questions on eigenvalues and eigenvectors, Revision,		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Probability & Statistics (MATH313TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	**1 - 4**	**Unit-I:** Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** Robert V. Hogg, Joseph W. McKean and Aen T. Craig, Introduction to Mathematical Statistics, Pearson Education, Asia, 2007.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	**1-2**	Probability mass/density functions		
	3 - 4	**Unit-II:** Mathematical expectations, moments, moment generating functions.		
September	**1 - 3**	Questions on moment generating functions, Characteristic function, discrete distribution: Uniform.	**2.** Irwin Miller and Marylees Miler, John E. Freund, Mathematical Statistics with Application, 7th Edition Pearson Education, Asia, 2006.	
	4	**Unit -III:** Binomial distribution,		
October	**1 - 4**	Poisson distribution, continuous distributions: uniform, normal distribution		
November	**1**	Exponential distribution.	**3.** Sheldon Ross, Introduction to probability Model 9th Ed. Academic Pres Indian Reprint, 2007.	
	3 -4	**Unit -IV:** Joint cumulative distributionfunction and its properties. Joint probability density functions		
December	**1 - 4**	Marginal and conditional distributions, expectation of functions of two random variables.		
February	**1 - 2**	Conditional expectations, independent and random variables.		
	2 - 4	Revision		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Integral Calculus (MATH309TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	1 - 4	**Unit-I:** Integration by Partial fractions Integration of rational and irrational functions.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** G.B. Thomas & R.L. Finney, Calculus, Pearson Education, 2017.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	1-2	Properties of definite integrals		
	3 - 4	**Unit-II:** Reduction formulae.		
September	1 - 3	Reduction formulae cont., Reduction by connecting two integrals Smaller index =1 method.	**2.**H. Anton, I. Bivens and S. Davis. Calculus, john Wiely and Sons (Asia) P. Ltd., 2002.	
	4	**Unit -III:**Curves in plane,		
October	1 - 4	Area and length of curves in the plane volume and surfaces of solids of revolution		
November	1	Cartesian and parametric form.		
	3 -4	**Unit -IV:**Double Integrals		
December	1 - 4	Triple integrals.		
February	1 - 2	Some questions on Double and triple integrals.		
	2 - 4	Revision		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Vector Calculus (MATH310TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	**1 - 4**	**Unit-I:** Scalar and vector product of three vectors, Product of four vectors, Reciprocal vectors. Scalar valued point functions	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** G.B. Thomas & R.L. Finney, Calculus, Pearson Education, 2017.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	**1-3**	Vector valued point functions. Derivative along a curve, directional derivatives.		
	3 - 4	**Unit-II:** Gradient of scalar point function.	**2.** H. Anton, I. Bivens and S. Davis. Calculus, john Wiely and Sons (Asia) P. Ltd., 2002.	
September	**1 - 4**	Divergence and curl of a vector point function, Divergence and curl of sums and products. Laplacian operator.	**3.** P.C. Matthew's, Vector Calculus, Springer Verlag London Limited, 1998.	
October	**1 - 4**	**Unit -III:** Orthogonal Curvilinear Coordinates, Condition for orthogonality. Fundamental triads of mutually orthogonal unit vectors.		
November	**1 - 2**	Gradient, Divergence, curl and Laplacian operators in terms of orthogonal curvilinear coordinates.		
	3 -4	**Unit -IV:** Vector Integration		
December	**1 - 4**	Line, surface and volume integrals. Theorems of Gauss, Green and Stokes		
February	**1 - 3**	Problems based on Gauss, Green and Stokes Theorems.		
	4	Revision		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Numerical Methods (MATH304TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	1 - 4	**Unit-I:** Algorithms, Convergence, Bisection method, False position method, Fixed point method.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** B. Bradie, A Friendly Introduction to Numerical Analysis. Pearson Education, India, 2007. **2.**M. K. Jain, S. R. K. Iyenger and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, 5th Ed., New age International Publisher, India, 2007.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	1-3	Newton's method, Secant method, LU decomposition.		
	4	**Unit-II:** Gauss-Jacobi method		
September	1 - 4	Gauss-Seidel and SOR iterative methods, Problems based on these methods.		
October	1 - 2	Lagrange and Newton interpolation: linear and higher order.		
	3 - 4	**Unit -III:**Finite difference operators, Numerical differentiation.		
November	1 - 2	Newton's forward difference and backward difference methods.		
	3 -4	Sterling's Central difference method, Problems based on above methods.		
December	1 - 4	**Unit -IV:**NumericalIntegration: Trapezoidal rule, Simpson's rule, questions on numerical integration.		
February	1 - 2	Euler's method.		
	3 - 4	Revision		

Yearly Teaching Plan

Name of the Department: **Mathematics**   Session: **2024-2025**

Course: **Algebra (MATH202TH)**

Month	Weeks	Books/Unit/Topics	Teaching Methods/ Resources	Students activities
July	1 - 4	**Unit-I:** Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn of integers under addition modulo n.	**Teaching Methods:** Lecture Methods/PPT **Resources:** **1.** John B. Fraleigh, A FIrst Course in Abstract Algebra, 7th Ed., Pearson, 2002. **2.** M. Artin, Abstract Algebra, 2nd Ed., Pearson, 2011. **3.** Joseph A Gallian, Contemporary Abstract Algebra, 4th Ed., Narosa, 1999.	1. Students Presentations 2. Class tests 3. Seminars 4. Quiz 5. Group Discussions
August	1-3	The group U(n) of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity.		
	4	**Unit-II:** Subgroups		
September	1 - 4	Cycle subgroups, the concept of a subgroup generated by a subset and the commutator subgroup of a group, examples of subgroups.		
October	1 - 2	Center of a group, Cosets, Index of subgroups, Lagrange's theorem, order of an element.		
	3 - 4	**Unit -III:** Normal subgroups: their definition, examples and characterization,		
November	1 - 4	Quotient groups. Kernel, Basic theorem of Homomorphism. First theorem of Homomorphism.		
December	1 - 4	**Unit -IV:** Definition and examples of Rings, examples of commutative and non-commutative rings: rings from number systems, Zn the ring of integers modulo n. Rings of matrices.		
February	1 - 3	Polynomial rings, subrings and ideals, definition of Integral domain and fields.		
	3 - 4	Revision		

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