M. P. GOVT. COLLEGE, AMB

DEPARTMENT OFMATHEMATICS
Teaching Plan
Academic Year:2023-24

Name of Department : Mathematics
Class   : B.A./B.Sc. Part-I

Course Type : Core Course   **Course Code/ Title: Differential Calculus (MATH101TH)**

Month / Week	Unit/Title	Topic ofLecture	No. of lectures	Methods/ModeofDelivery
August / September	Unit–I / Limit , Continuity and discontinuities	Limit and Continuity (epsilon and delta definition), Types of discontinuities, Differentiability offunctions, Successive differentiation, Leibnitz's theorem	18	1. Online Chalk & talkMethod 2. Problem Solving 3. GroupDiscussion 4. Surprise class test 5. Fliptheclass 6. PDFNotes
September / October	Unit–II / **Lagrange's , Cauchy Theorems & Taylor's series.**	Indeterminate forms, Rolle's theorem, Lagrange's & Cauchy Mean Value theorems, Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Taylor's series. Maclaurin's series of sin x, cos x, e x , log(l+x), (l+x)m .	19	1. Online Chalk & talkMethod 1. Problem Solving 2. GroupDiscussion 3. Surpriseclassntest 4. Fliptheclass 5. PDFNotes 6. OnlineLectures
October / Noverber	Unit –III / **Concavity, Convexity & Curvature**	Concavity, Convexity & Points of Inflexion, Curvature, Radius of curvature, center of curvature, Asymptotes, Singular points, Double point, Polar coordinates, Relation between Cartesian and polar coordinates.	19	1. Chalk&talkMethod 2. Problem Solving 3. GroupDiscussion 4. Surprise class test 5. Fliptheclass

December	Unit–IV / Homogeneous Functions, Maxima and Minima	Functions of several variables (upto three variables): Limit and Continuity of these functions Partial differentiation, Euler's theorem on homogeneous functions, Maxima and Minima with Lagrange Multipliers Method (two variables), Jacobian (upto three variables).	18	1. Chalk&talkMethod 2. Problem Solving 3. GroupDiscussion 4. Surprise class test 5. Fliptheclass 6. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	1. Chalk&talkMethod 2. Problem Solving 3. GroupDiscussion 4. Surprise classtest 5. Fliptheclass 6. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	1. Chalk&talkMethod 2. Problem Solving 3. GroupDiscussion 4. Surprise classtest 5. Fliptheclass 6. PDFNotes

Teaching Plan
Academic
Year:2023-24

Name of Department : Mathematics
Class   : B.A./B.Sc. Part-I
Course Type : Core Course   **Course Code/ Title: Differential Equations**
                                                   (MATH102TH)

Month / Week	Unit/Title	Topic ofLecture	No. of lectures	Methods/ModeofDelivery
August / September	Unit–I / **Linear Differential Equations, Wronskian, and Exact Differential Equations**	Basic theory of linear differential equations, Wronskian, and its properties. First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree equations solvable for x, y, p. Clairut's form	18	7. Online Chalk & talkMethod 8. Problem Solving 9. GroupDiscussion 10. Surprise class test 11. Fliptheclass 12. PDFNotes
September / October	Unit–II / **Higher-Order Differential Equations & Linear Equations**.	Methods for solving higher-order differential equations. Solving a differential equation by reducing its order. Linear homogenous equations with constant coefficients, Linear nonhomogenous equations.	19	1. Online Chalk & talkMethod 7. Problem Solving 8. GroupDiscussion 9. Surpriseclassntest 10. Fliptheclass 11. PDFNotes 12. OnlineLectures
October / Noverber	Unit –III / **Variation of Parameters**	The method of variation of parameters with constant coefficients. The Cauchy-Euler equation and Legendre equation. Simultaneous differential equations, Total differential equations.	19	6. Chalk&talkMethod 7. Problem Solving 8. GroupDiscussion 9. Surprise class test 10. Fliptheclass

December	Unit–IV / **Partial Differential Equations**	Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations. Formation of first order partial differential equations(PDE). Linear partial differential equation of first order, Lagrange's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.	18	7. Chalk&talkMethod 8. Problem Solving 9. GroupDiscussion 10. Surprise class test 11. Fliptheclass 12. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	7. Chalk&talkMethod 8. Problem Solving 9. GroupDiscussion 10. Surprise classtest 11. Fliptheclass 12. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	7. Chalk&talkMethod 8. Problem Solving 9. GroupDiscussion 10. Surprise classtest 11. Fliptheclass 12. PDFNotes

NameofDepartment:Mathematics
Class: B.A./ B.Sc. Part-II (PCM & C. Sci.)
CourseType: CoreCourse   **CourseCode/ Title: i) Real Analysis(MATH201TH)**

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Bounded sets, suprema and infima**	Real line, bounded sets, suprema and infima, completeness property of R, Archimedean propertyofR,intervals.ConceptofclusterpointsandstatementofBolzano-Weierstrasstheorem.	18	13. Online Chalk & talkMethod 14. Problem Solving 15. GroupDiscussion 16. Surprise class test 17. Fliptheclass 18. PDFNotes
September / October	Unit–II / **Chauchy Convergence**	RealSequence,Boundedsequence,Cauchyconvergencecriterionforsequences.Cauchy'stheoremonlimits,orderpreservationandsqueezetheorem,monotonesequencesandtheirconvergence(monotoneconvergencetheoremwithoutproof).	19	1. Online Chalk & talkMethod 13. Problem Solving 14. GroupDiscussion 15. Surpriseclassntest 16. Fliptheclass 17. PDFNotes 18. OnlineLectures
October / Noverber	Unit –III / **Infinite series and Cauchy Test**	Infinite series. Cauchy convergence criterion for series, positive term series, geometric series,comparisontest,convergenceofp-series,Roottest,Ratiotest,alternatingseries,Leibnitz'stest	19	11. Chalk&talkMethod 12. Problem Solving 13. GroupDiscussion 14. Surprise class test 15. Fliptheclass

December	Unit–IV / **Sequences and Series**	Sequencesandseriesoffunctions,Pointwiseanduniformconvergence.M_n-test,M-test,Resultsaboutuniformconvergence,Powerseriesandradiusofconvergence. .	18	13. Chalk&talkMethod 14. Problem Solving 15. GroupDiscussion 16. Surprise class test 17. Fliptheclass 18. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	13. Chalk&talkMethod 14. Problem Solving 15. GroupDiscussion 16. Surprise classtest 17. Fliptheclass 18. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	13. Chalk&talkMethod 14. Problem Solving 15. GroupDiscussion 16. Surprise classtest 17. Fliptheclass 18. PDFNotes

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TeachingPlanAcademic
Year:2023-24

NameofDepartment : Mathematics
Class: B.A./B.Sc. Part-II (PCM & C. Sci.)
CourseType : CoreCourse   **Course Code/ Title: i) Algebra (MATH202TH)**

Month/ Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I/ **Groups**	Definition and examples of groups, examples of abelian and non-abelian groups, the group Zn ofintegers under addition modulo n and the group U(n) of units under multiplication modulo n.Cyclicgroupsfromnumbersystems,complexrootsofunity	21	19. Online Chalk & talkMethod 20. Problem Solving 21. GroupDiscussion 22. Surpriseclass test 23. Fliptheclass 24. PDFNotes
September / October	Unit–II/ **Subgroups**	Subgroups,cyclicsubgroups, theconceptofasubgroupgeneratedbyasubsetandthecommutator subgroup of group, examples of subgroups including the center of a group. Cosets,Indexofsubgroup, Lagrange'stheorem,orderofanelement.	19	1. Online Chalk & talkMethod 19. Problem Solving 20. GroupDiscussion 21. Surpriseclassntest 22. Fliptheclass 23. PDFNotes 24. OnlineLectures
October / Noverber	Unit –III / **Normal Subgroups & Homomorphism**	Normal subgroups: their definition,examples, and characterizations, Quotient groups. DefinitionofKernel, Basictheoremsof homomorphism.First theoremof Homomorphism.	19	16. Chalk&talkMethod 17. Problem Solving 18. GroupDiscussion 19. Surprise class test 20. Fliptheclass

December	Unit–IV/ **Ring, Subrings**	Definition and examples of rings, examples of commutative and non-commutative rings: ringsfromnumbersystems,$Z_n$theringofintegersmodulon. Ringsof matrices,Subringsand ideals ,Definition ofIntegraldomainsandfields . .	18	19. Chalk&talkMethod 20. Problem Solving 21. GroupDiscussion 22. Surpriseclass test 23. Fliptheclass 24. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	19. Chalk&talkMethod 20. Problem Solving 21. GroupDiscussion 22. Surprise classtest 23. Fliptheclass 24. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	19. Chalk&talkMethod 20. Problem Solving 21. GroupDiscussion 22. Surprise classtest 23. Fliptheclass 24. PDFNotes

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DEPARTMENT OFMATHEMATICS
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Year:2023-24

NameofDepartment:Mathematics

Class: B.A./ B.Sc. Part-II (MATHS)

CourseType: Skill Enhancement Course   **CourseCode/ Title: Integral Calculus (MATH309TH)**

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Integration by Partial Fractions**	Integration by Partial fractions, integration of rational and irrational functions. Properties of definite integrals.	12	25. Online Chalk & talkMethod 26. Problem Solving 27. GroupDiscussion 28. Surprise class test 29. Fliptheclass 30. PDFNotes
September / October	Unit–II / **Reduction Formulae**	Reduction Formulae, $\int Sinnx\ dx$, $\int Cosnx\ dx$, $\int e\ ax\ x\ ndx$, $\int x\ n\ (logx)\ mdx$, $\int x\ nSinxdx$, $\int x\ n\ cosxdx$, $\int Sinnx\ Coxnxdx$, , $\int Sin\ \pi/2\ n\ 0\ x$dx, $\int Cos\ \pi/2\ n\ 0\ x$dx, $\int Sin\ \pi/2\ n\ 0\ xCoxnx$dx. Reduction by connecting two integrals (Smaller Index + 1 Method).	10	1. Online Chalk & talkMethod 25. Problem Solving 26. GroupDiscussion 27. Surpriseclassntest 28. Fliptheclass 29. PDFNotes 30. OnlineLectures
October / Noverber	Unit –III / **Areas and Lengths**	Areas and lengths of curves in the plane, volumes and surfaces of solids of revolution, Cartesian and parametric form.	11	21. Chalk&talkMethod 22. Problem Solving 23. GroupDiscussion 24. Surprise class test 25. Fliptheclass

December	Unit–IV / **Double and Triple Integrals**	Double and Triple integrals.	11	25. Chalk&talkMethod 26. Problem Solving 27. GroupDiscussion 28. Surprise class test 29. Fliptheclass 30. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	25. Chalk&talkMethod 26. Problem Solving 27. GroupDiscussion 28. Surprise classtest 29. Fliptheclass 30. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	25. Chalk&talkMethod 26. Problem Solving 27. GroupDiscussion 28. Surprise classtest 29. Fliptheclass 30. PDFNotes

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Year:2023-24

NameofDepartment:Mathematics

Class: B.A./ B.Sc. Part-II (MATHS)

CourseType: Skill Enhancement Course **CourseCode/ Title: Vector Calculus (MATH310TH)**

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Scalar and Vector Product**	Scalar and vector product of three vectors. Product of four vectors. Reciprocal vectors. Vector differentiation, Scalar valued point functions, vector valued point functions. Derivative along a curve, directional derivatives.	12	31. Online Chalk & talkMethod 32. Problem Solving 33. GroupDiscussion 34. Surprise class test 35. Fliptheclass 36. PDFNotes
September / October	Unit–II / **Divergence and Curl of a Vector**	Gradient of a scalar point function. Divergence and curl of a vector point function. Gradient, Divergence and curl of sums and products. Laplacian operator.	10	1. Online Chalk & talkMethod 31. Problem Solving 32. GroupDiscussion 33. Surpriseclassntest 34. Fliptheclass 35. PDFNotes 36. OnlineLectures
October / Noverber	Unit –III / **Coordinates Divergence & Orthogonal**	Orthogonal curvilinear coordinates. Conditions for orthogonality. Fundamental triads of mutually orthogonal unit vectors. Gradient, Divergence, Curl and Laplacian operators in terms of orthogonal curvilinear coordinators.	11	26. Chalk&talkMethod 27. Problem Solving 28. GroupDiscussion 29. Surprise class test 30. Fliptheclass

December	Unit–IV / **Vector Integration**	Vector integration: line integral, surface integral, Volume integral Theorems of Gauss, Green and Stokes (without proof) and the problems based on these theorems.	11	31. Chalk&talkMethod 32. Problem Solving 33. GroupDiscussion 34. Surprise class test 35. Fliptheclass 36. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	31. Chalk&talkMethod 32. Problem Solving 33. GroupDiscussion 34. Surprise classtest 35. Fliptheclass 36. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	31. Chalk&talkMethod 32. Problem Solving 33. GroupDiscussion 34. Surprise classtest 35. Fliptheclass 36. PDFNotes

NameofDepartment:Mathematics

Class: B.A./ B.Sc. Part-III (PCM & C. Sci.)

CourseType: Discipline Specific Elective

CourseCode/ Title: Matrices (MATH301TH)

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Types of matrices**	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 three.	18	37. Online Chalk & talkMethod 38. Problem Solving 39. GroupDiscussion 40. Surprise class test 41. Fliptheclass 42. PDFNotes
September / October	Unit–II / **Diagonal Form & Rank of Matrix.**	Matrices in diagonal form. Reduction to diagonal form upto matrices of order 3. Computation of matrix inverses using elementary row operations. Rank of matrix. Solutions of a system of linear equations using matrices. Illustrative examples of above concepts from Geometry, Physics, Chemistry, Combinatorics and Statistics.	19	1. Online Chalk & talkMethod 37. Problem Solving 38. GroupDiscussion 39. Surpriseclassntest 40. Fliptheclass 41. PDFNotes 42. OnlineLectures
October / Noverber	Unit –III / **Vector space**	Definition of Vector space, R, R2, R3 as vector spaces over R, Concept of Linear dependence/Independence, Standard basis for R, R2, R3, Examples of different bases. Subspaces of R2, R3.	19	31. Chalk&talkMethod 32. Problem Solving 33. GroupDiscussion 34. Surprise class test 35. Fliptheclass

December	Unit–IV / **Eigen Values and Eigen Vectors**	Translation, Dilation, Rotation, Reflection in a point, line and plane. Matrix form of basic geometric transformations. Interpretation of eigenvalues and eigen vectors for such transformations and eigen spaces as invariant subspaces.	18	37. Chalk&talkMethod 38. Problem Solving 39. GroupDiscussion 40. Surprise class test 41. Fliptheclass 42. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	37. Chalk&talkMethod 38. Problem Solving 39. GroupDiscussion 40. Surprise classtest 41. Fliptheclass 42. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	37. Chalk&talkMethod 38. Problem Solving 39. GroupDiscussion 40. Surprise classtest 41. Fliptheclass 42. PDFNotes

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Year:2023-24

NameofDepartment:Mathematics

Class: B.A./ B.Sc. Part-III (PCM & C. Sci.)

CourseType: Discipline Specific Elective   **CourseCode/ Title: Numerical Methods (MATH304TH)**

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Algorithms**	Algorithms, Convergence, Bisection method, False position method, Fixed point iteration method, Newton's method, Secant method, LU decomposition.	18	43. Online Chalk & talkMethod 44. Problem Solving 45. GroupDiscussion 46. Surprise class test 47. Fliptheclass 48. PDFNotes
September / October	Unit–II / **Gauss Iterative Methods**	Gauss-Jacobi, Gauss-Siedel and SOR iterative methods, Lagrange and Newton interpolation: linear and higher order.	19	1. Online Chalk & talkMethod 43. Problem Solving 44. GroupDiscussion 45. Surpriseclassntest 46. Fliptheclass 47. PDFNotes 48. OnlineLectures
October / Noverber	Unit –III / **Numerical Differentiation**	Finite difference operators, Numerical differentiation: Newton's forward difference and backward difference method, Sterling's Central difference method.	19	36. Chalk&talkMethod 37. Problem Solving 38. GroupDiscussion 39. Surprise class test 40. Fliptheclass

December	Unit–IV / Trapezoidal, Simpson's & Euler's Method	Integration: Trapezoidal rule, Simpson's rule, Euler's method	18	43. Chalk&talkMethod 44. Problem Solving 45. GroupDiscussion 46. Surprise class test 47. Fliptheclass 48. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	43. Chalk&talkMethod 44. Problem Solving 45. GroupDiscussion 46. Surprise classtest 47. Fliptheclass 48. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	43. Chalk&talkMethod 44. Problem Solving 45. GroupDiscussion 46. Surprise classtest 47. Fliptheclass 48. PDFNotes

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DEPARTMENT OFMATHEMATICS
TeachingPlanAcademic Year:2023-24

NameofDepartment:Mathematics

CourseType: Skill Enhancement Course

Class: B.A./ B.Sc. Part-III (MATHS)
CourseCode/ Title: Probability and Statistics (MATH313TH)

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Probability Axioms**	Sample space, probability axioms, real random variables (discrete and continuous), cumulative distribution function, probability mass/density functions.	12	49. Online Chalk & talkMethod 50. Problem Solving 51. GroupDiscussion 52. Surprise class test 53. Fliptheclass 54. PDFNotes
September / October	Unit–II / Mathematical Expectation and Distributions	Mathematical expectation, moments, moment generating function, characteristic function, discrete distributions: uniform.	10	1. Online Chalk & talkMethod 49. Problem Solving 50. GroupDiscussion 51. Surpriseclassntest 52. Fliptheclass 53. PDFNotes 54. OnlineLectures
October / Noverber	Unit –III / **Binomial, Poisson & Continuous Distributions**	Binomial, Poisson, continuous distributions: uniform, normal, exponential.	11	41. Chalk&talkMethod 42. Problem Solving 43. GroupDiscussion 44. Surprise class test 45. Fliptheclass

December	Unit–IV / **Distribution Function and its Properties**	Joint cumulative distribution function and its properties, joint probability density functions, marginal and conditional distributions, expectation of function of two random variables, conditional expectations, independent random variables.	11	49. Chalk&talkMethod 50. Problem Solving 51. GroupDiscussion 52. Surprise class test 53. Fliptheclass 54. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	49. Chalk&talkMethod 50. Problem Solving 51. GroupDiscussion 52. Surprise classtest 53. Fliptheclass 54. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	49. Chalk&talkMethod 50. Problem Solving 51. GroupDiscussion 52. Surprise classtest 53. Fliptheclass 54. PDFNotes

NameofDepartment:Mathematics

Class: B.A./ B.Sc. Part-III (MATHS & C. Sci.)
CourseType: Skill Enhancement Course   **CourseCode/ Title: Transportation and Game Theory (MATH317TH)**

Month / Week	Unit/Title	Topic ofLecture	No. oflectures	Methods/ModeofDelivery
August / September	Unit–I / **Transportation Problem**	Transportation problem and its mathematical formulation. northwest-corner method, least cost method.	12	55. Online Chalk & talkMethod 56. Problem Solving 57. GroupDiscussion 58. Surprise class test 59. Fliptheclass 60. PDFNotes
September / October	Unit–II / **Algorithm for Solving Transportation Problem**	Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem.	10	1. Online Chalk & talkMethod 55. Problem Solving 56. GroupDiscussion 57. Surpriseclassntest 58. Fliptheclass 59. PDFNotes 60. OnlineLectures
October / Noverber	Unit –III / **Assignment Problem**	Assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.	11	46. Chalk&talkMethod 47. Problem Solving 48. GroupDiscussion 49. Surprise class test 50. Fliptheclass

December	Unit–IV / **Game Theory**	Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure	11	55. Chalk&talkMethod 56. Problem Solving 57. GroupDiscussion 58. Surprise class test 59. Fliptheclass 60. PDF notes
February-24	UNIT-I & II	REVISION (SolvingProblemsandexercises)	8	55. Chalk&talkMethod 56. Problem Solving 57. GroupDiscussion 58. Surprise classtest 59. Fliptheclass 60. PDFNotes
March-24	UNIT-III&IV	REVISION (SolvingProblemsandexercises)	8	55. Chalk&talkMethod 56. Problem Solving 57. GroupDiscussion 58. Surprise classtest 59. Fliptheclass 60. PDFNotes

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