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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2023-2024 (Odd Sem)**  **Class-B.Sc-1st semester Paper-Calculus** | | | |
| **S.No** | **WEEK** | **TOPIC** |  |
| 1 | 24.07.2023-29.07.2023 | Limit of a Function, Left hand & Right hand limit, Uniqueness, Infinite Limits, Squeeze Principle, Continuous and Discontinuous functions, Kinds of Discontinuity all it’s related problems. Derivability at an Interior Point. |  |
| 2 | 01.08.2023-05.08.2023 | Successive Differentiation, Standard results for nth derivatives. Find nth derivative using Partial fractions. |  |
| 3 | 07.08.2023-12.08.2023 | Leibnitz’s Theorem and all it’s related problems. Calculation of nth derivative at x=0 and all it’s related problems. |  |
| 4 | 14.08.2023-19.08.2023 | General theorems on Differentiable functions and expansions- Taylor’s Theorem with Lagrange’s form of remainder after ‘n’ terms. Maclaurin’s Theorem with Lagrange’s form of remainder. Taylor’s Theorem with Cauchy’s form of remainder. |  |
| 5 | 21.08.2023-26.08.2023 | Taylor’s Infinite Series and all it’s related problems. Expansion by Differential Equations. Method of Differentiation and Integration. |  |
| 6 | 28.08.2023-31.08.2023 | Asymptotes-Finite and infinite branches of a curve. Asymptotes, Horizontal and Vertical asymptotes. Asymptotes parallel to Axes of Co-ordinates. Oblique Asymptotes. Oblique asymptotes of the general algebraic curve. |  |
| 7 | 04.09.2023-09.09.2023 | Alternative methods of finding asymptotes of algebraic curves. Intersection of the curve and its asymptotes. Asymptotes of polar curve. Position of the curve with respect to the asymptotes. |  |
| 8 | 11.09.2023-16.09.2023 | Curvature-Intrinsic equation of a curve. Curvature in Intrinsic form, Radius of curvature. Curvature of circle. Radius of curvature for Cartesian equations, for Parametric equations, for Polar equations, for Pedal equations. |  |
| 9 | 18.09.2023-23.09.2023 | Radius of curvature for Polar tangential equations. Radius of curvature at the origin. Centre of curvature, circle of curvature and evolute of a curve. Chord of curvature. |  |
| 10 | 25.09.2023-30.09.2023 | Singular Points-Multiple Points, Points of inflexion. Types of double points-Node, Cusp, Conjugate or Isolated points. Condition for the existence of a double point on a curve. Species of Cusps. Concavity and Convexity. Point of Inflexion. |  |
| 11 | 02.10.2023-07.10.2023 | Curve Tracing-Tracing of Cartesian Curves,Parametric equations. Tracing of polar curves and all it’s related problems. |  |
| 12 | 09.10.2023-14.10.2023 | Reduction Formule- for different trigonometric functions, Exponential functions. |  |
| 13 | 16.10.2023-21.10.2023 | Rectification-Fundamental Theorem about Rectification. Length of the Parametric curves and all it’s related problems. |  |
| 14 | 23.10.2023-28.10.2023 | Length of Polar Curves and all it’s related problems. Intrinsic equation of a curve. |  |
| 15 | 01.11.2023-04.11.2023 | Quadrature, Area between two curves. Area Formula for Parametric Curves. Area between two polar curves. |  |
| 16 | 06.11.2023-09.11.2023 | Volumes and Surfaces of Solids of Revolution. Volume of a solid of revolution. Any Axis of Revolution. Volume formula for two solids. Volume formula for parametric curves. Volume formula for polar curves. Area of a surface of revolution. Centroid. |  |
| 17 | 10.11.2023-16.11.2023 | Diwali Break |  |
| 18 | 20.11.2023-24.11.2023 | Revision of all Units |  |
| 19 | 25.11.2023-23.12.2023 | Examinations |  |
| 20 | 24.12.2023-31.12.2023 | Winter Vacation |  |

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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2023-2024 (Odd Sem)**  **Class-B.Sc-3rd semester Paper-Partial Differential Equations** | | | |
| **S.No** | **WEEK** | **TOPIC** |  |
| 1 | 24.07.2023-29.07.2023 | Partial Differential Equations-Order and degree of P.D.E’s, Linear and Non-Linear P.D.E, Formation of equation by the elimination of Arbitrary Constants with numerical problems. Formation of equation by the elimination of Arbitrary Functions with numerical problems. |  |
| 2 | 01.08.2023-05.08.2023 | First Order Linear P.D.E’s, Classification of the Solution of P.D.E’s, Solution of Linear P.D.E’s by direct integration. Solution of Lagrange’s Linear Equation with numerical problems. |  |
| 3 | 07.08.2023-12.08.2023 | First Order Non Linear P.D.E’s-Compatible system of P.D.E’s of order one. General Methods of Solution-(i) Charpit’s Method with some standard forms. |  |
| 4 | 14.08.2023-19.08.2023 | General Methods of Solution –(ii) Jacobi’s Method with numerical problems. |  |
| 5 | 21.08.2023-26.08.2023 | Linear Partial Differential Equations of Second and Higher Order- Linear Homogenous P.D.E of order n, Solution of Homogenous Linear P.D.E’s with constant coefficients. |  |
| 6 | 28.08.2023-31.08.2023 | Solution of Non Homogenous Linear P.D.E’s with constant coefficients with all Numerical Problems. |  |
| 7 | 04.09.2023-09.09.2023 | Partial Differential Equations with Variable Coefficients Reducible to Equations with Constant Coefficients with all Numerical Problems. |  |
| 8 | 11.09.2023-16.09.2023 | Classification of Second Order Linear Partial Differential Equations. Canonical Forms (Normal Forms). Reduction of second order Linear P.D.E’s to Canonical forms-(i) Reduction of Hyperbolic Equation to its Canonical Form -(ii) Reduction of Parabolic Equation to its Canonical Form with all Numerical Problems. |  |
| 9 | 18.09.2023-23.09.2023 | (iii) Reduction of Elliptic Equation to its Canonical Form. Solution of Linear Hyperbolic Equations-Riemann’s Method with all Numerical Problems. |  |
| 10 | 25.09.2023-30.09.2023 | Monge’s Methods for Partial Differential Equations of Second Order. Method (i) To solve equation of the type Rr+Ss+Tt=V, where r,s,t have usual meaning. |  |
| 11 | 02.10.2023-07.10.2023 | Monge’s Method (ii) To solve equation of the type Rr+Ss+Tt+U9rt-S2 =V, where r,s,t have usual meaning. |  |
| 12 | 09.10.2023-14.10.2023 | Characteristics of Second Order Partial Differential Equations-Characteristic Equations and Characteristic Curves. Cauchy’s Problems with all Numerical |  |
| 13 | 16.10.2023-21.10.2023 | Method of Separation of Variables: Wave, Heat and Laplace Equations. Method of Separation of Variables-One Dimensional Wave Equation” Solution by Method of Separation of Variables. Solution of Two Dimensional Wave Equation. |  |
| 14 | 23.10.2023-28.10.2023 | Solution of One Dimensional & Two Dimensional Heat ( Diffusion) Equation. |  |
| 15 | 01.11.2023-04.11.2023 | Solution of Two Dimensional Laplace Equation. Solution of Laplace Equation satisfying given Initial and Boundary Conditions. |  |
| 16 | 06.11.2023-09.11.2023 | Revision of unit I & II |  |
| 17 | 10.11.2023-16.11.2023 | Diwali Break |  |
| 18 | 20.11.2023-24.11.2023 | Revision of unit III & IV |  |
| 19 | 25.11.2023-23.12.2023 | Examinations |  |
| 20 | 24.12.2023-31.12.2023 | Winter Vacation |  |

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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2023-2024 (Odd Sem)**  **Class-B.Sc-5th semester Paper-Real Analysis** | | | |
| **S.No** | **WEEK** | **TOPIC** |  |
| 1 | 24.07.2023-29.07.2023 | Riemann Integral-Partition of a closed interval, Norm & Refinement of a Partition, Upper & Lower Sums, Oscillatory Sum & all related theorems. Riemann Integral, Darboux’s Theorem. Conditions of Integrability, Integrability of Continuous functions and all related theorems. |  |
| 2 | 01.08.2023-05.08.2023 | Integrability of Monotonic functions. Integral as a limit of Sum. Riemann Sum. Second definition of Integrability and all related theorems and Numerical Problems. Properties of Riemann Integral and all related theorems and Numerical Problems. |  |
| 3 | 07.08.2023-12.08.2023 | First Mean Value Theorem, Theorems on Continuity and Differentiability of Integrable Functions. Primitive of a Function. Fundamental Theorem of Integral Calculus. Mean value Theorems of Integral Calculus. Second mean value theorem and all related Numerical Problems. |  |
| 4 | 14.08.2023-19.08.2023 | Impropal Integral-Types of Impropal Integral. Convergence of Improper Integral of First kind and Second Kind. Comparison Tests for Convergence of Integral. Comparison test I & II. |  |
| 5 | 21.08.2023-26.08.2023 | An Important Comparison Integral. Discussion of convergence of important function i.e. Beta function and all related problems. General test for Convergence of Integral- Cauchy’s Test. Absolute Convergence. |  |
| 6 | 28.08.2023-31.08.2023 | Comparison test for Convergence at Infinity, An Important Comparison Integral. Convergence of Gamma Integral. General test for convergence at Infinity-Cauchy’s Test. Abel’s test for Convergence. Dirichlet’s test for convergence. Frullani’s Integral. |  |
| 7 | 04.09.2023-09.09.2023 | Integral as a function of a Parameter-Continuity of the Integral, Derivability of the Integral. Integrability of an Integral of a function of Parameter and all related problems. |  |
| 8 | 11.09.2023-16.09.2023 | Metric and Metric Spaces-it’s all related examples and questions. Bounded Sequence and Bounded Functions. Induced Metric. Semi Metric Space. Diameter of a Subset. Bounded and unbounded Metric Spaces. |  |
| 9 | 18.09.2023-23.09.2023 | Open and Closed Sets in Metric Spaces-Open Sphere and Closed Sphere. Interior Point and Neighbourhood of a point. Interior of a Set. Open Set and it’s all related theorems. |  |
| 10 | 25.09.2023-30.09.2023 | Adherent Point, Limit Point, Isolated point, Derived Set, Closure of a Set. Closed Set and it’s all related theorems. Exterior Points and Exterior of a set. Boundary points and Boundary of a set |  |
| 11 | 02.10.2023-07.10.2023 | Completeness in Metric Space-Sequences in Metric Spaces. Convergence in a Metric Space. Cauchy Sequence. Complete Metric Space. Subsequence and all it’s related theorems. |  |
| 12 | 09.10.2023-14.10.2023 | Cantor’s Intersection Theorem and it’s Inverse. Nowhere Dense set. First Category Space. Baire’s Category Theorem. Contraction Principle in a Metric Space. Banach’s Fixed Point Theorem. |  |
| 13 | 16.10.2023-21.10.2023 | Continuity and uniform Continuity in Metric Spaces- Continuous function and it’s all related theorems. Uniform Continuity and it’s all related theorems. Isometry. |  |
| 14 | 23.10.2023-28.10.2023 | Compactness in Metric Spaces- Covers, Compact set and Compact Metric Space. Bolzano Weierstrass Property (BWP), Sequentially Compact Metric Space. Countably Compact Spaces and it’s all related theorems.Finite Intersection Property (FIP), Total Boundedness, Continuity and Compactness. |  |
| 15 | 01.11.2023-04.11.2023 | Connectedness in Metric Spaces- Separated Sets, Connected and Disconnected Sets and it’s all related theorems. Component, Continuity and connectedness. Totally Disconnected Spaces. |  |
| 16 | 06.11.2023-09.11.2023 | Revision of Unit I & II |  |
| 17 | 10.11.2023-16.11.2023 | Diwali Break |  |
| 18 | 20.11.2023-24.11.2023 | Revision of Unit III & IV |  |
| 19 | 25.11.2023-23.12.2023 | Examinations |  |
| 20 | 24.12.2023-31.12.2023 | Winter Vacation |  |

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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2023-2024 (Odd Sem)**  **SUBJECT-Mathematics Class-B.Sc-5th semester Paper-Numerical Analysis** | | | |
| **S.No** | **WEEK** | **TOPIC** |  |
| 1 | 24.07.2023-29.07.2023 | Finite Difference Operators-Argument and entry, interval of Differencing. Forward Differences, Backward Differences. Fundamental theorem of difference calculus. The operator E, Effect of an error in a Tabular Value. One or more Missing terms. |  |
| 2 | 01.08.2023-05.08.2023 | Interpolation with Equal Intervals-Newton Gregory formula for forward Interpolation and Backward Interpolation. Subdivision of Intervals. |  |
| 3 | 07.08.2023-12.08.2023 | Interpolation with Unequal Intervals-Divided Differences. Newton’s divided Difference Interpolation Formula for Unequal Intervals. |  |
| 4 | 14.08.2023-19.08.2023 | Lagrange’s Interpolation Formula. Hermite’s Interpolation Formula. |  |
| 5 | 21.08.2023-26.08.2023 | Central Difference Interpolation Formulae-Gauss Forward & Backward Interpolation Formula. Sterling Formula. Bessel’s Formula. |  |
| 6 | 28.08.2023-31.08.2023 | Probability Distributions-Events or Cases. Probability of Equally Likely Outcomes. Conditional Probability. Independent Events. Random Variable. Probability Distribution of a Random Variable. Mean and Variance of a Rndom Variable. |  |
| 7 | 04.09.2023-09.09.2023 | Binomial Distribution-Mean and Variance of Binomial Distribution. Recurrence Formula. Fitting a Binomial Distribution. |  |
| 8 | 11.09.2023-16.09.2023 | Poisson Distribution- Mean and Variance of Poisson Distribution. Recurrence Formula. Fitting a Poisson Distribution. Normal Distribution-Probability Density Function. Standard Normal Distribution. Fitting of a Normal Curve. |  |
| 9 | 18.09.2023-23.09.2023 | Numerical Distribution-Derivatives using Newton’s Forward Interpolation Formula , Backward’s Interpolation Formula, Sterling Central Interpolation Formula. Newton’s Divided Difference Formula. |  |
| 10 | 25.09.2023-30.09.2023 | Eigen Value Problems-Eigen Values and Eigen Vectors. Power Method. Jacobi’s Method for Symmetric Matrix. |  |
| 11 | 02.10.2023-07.10.2023 | Given’s Method. House-Holder’s Method. QR Method. Lanczo’s Method. |  |
| 12 | 09.10.2023-14.10.2023 | Numerical Integral-Newton-Cotes Quadrature Formula. Trapezoidal Rule. Simpson’s One-Third Rule. Simpson’s Three-Eighth Rule. |  |
| 13 | 16.10.2023-21.10.2023 | Error in a Quadrature Formulae. Gauss Quadrature Formula. Chebyshev’s Quardature Formula. |  |
| 14 | 23.10.2023-28.10.2023 | Numerical Solution of Ordinary Differential Equations-Solution of a Differential Equation, Initial Boundary Conditions. Euler’s Method. Modified Euler’s Method.  Taylor’s Series Method. |  |
| 15 | 01.11.2023-04.11.2023 | Runge-Kutta Method—R-K Method of First Order, Second order, Third Order, Fourth Order. Picard’s Method. |  |
| 16 | 06.11.2023-09.11.2023 | Predictor-Corrector Method. Milne-Simpson’s Method. Adams-Bashforth Method. |  |
| 17 | 10.11.2023-16.11.2023 | Diwali Break |  |
| 18 | 20.11.2023-24.11.2023 | Revision of all Units. |  |
| 19 | 25.11.2023-23.12.2023 | Examinations |  |
| 20 | 24.12.2023-31.12.2023 | Winter Vacation |  |