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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2019-20 (Odd Sem)**  **Class-B.Sc-1st semester Paper-Calculus** | | |
| **S.No** | **WEEK** | **TOPIC** |
| 1 | 16 July - 20 July | 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 | 22 July -26 July | Successive Differentiation, Standard results for nth derivatives. Find nth derivative using Partial fractions. |
| 3 | 29 July -03 Aug. | Leibnitz’s Theorem and all it’s related problems. Calculation of nth derivative at x=0 and all it’s related problems. |
| 4 | 05 Aug. - 10 Aug. | 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 | 12 Aug.-17 Aug. | Taylor’s Infinite Series and all it’s related problems. Expansion by Differential Equations. Method of Differentiation and Integration. |
| 6 | 19 Aug. -24 Aug. | 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 | 26 Aug. -31 Aug. | 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 | 02 Sept.- 07 Sept. | 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 | 09 Sept. -14 Sept. | 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 | 16 Sept. -21 Sept. | Singular Points-Multiple Points, Points of inflexion. Types of double points-Node, Cusp, Conjugate or Isolated points. |
| 11 | 23 Sept. -28 Sept. | Condition for the existence of a double point on a curve. Species of Cusps. Concavity and Convexity. Point of Inflexion. |
| 12 | 01 Oct.-05 Oct. | Curve Tracing-Tracing of Cartesian Curves,Parametric equations. Tracing of polar curves and all it’s related problems. |
| 13 | 07 Oct.-12 Oct. | Reduction Formule- for different trigonometric functions, Exponential functions. |
| 14 | 14 Oct. -19 Oct. | Rectification-Fundamental Theorem about Rectification. Length of the Parametric curves and all it’s related problems. |
| 15 | 21 Oct.-23 Oct. | Length of Polar Curves and all it’s related problems. Intrinsic equation of a curve. |
| 16 | 24 Oct. -30 Oct. | Quadrature, Area between two curves. Area Formula for Parametric Curves. Area between two polar curves. |
| 17 | 04 Nov.-09 Nov. | Volumes and Surfaces of Solids of Revolution. Volume of a solid of revolution. Any Axis of Revolution. Volume formula for two solids. |
| 18 | 11 Nov.- 16 Nov. | Volume formula for parametric curves. Volume formula for polar curves. Area of a surface of revolution. Centroid. |
| 19 | 19 Nov. onwards | EXAMINATION |
| 20 | 20 Dec. -31 Dec. | WINTER VACATION |

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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2019-20 (Odd Sem)**  **Class-B.Sc-5th semester Paper-Real Analysis** | | |
| **S.No** | **WEEK** | **TOPIC** |
| 1 | 16 July - 20 July | 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 | 22 July -26 July | 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 | 29 July -03 Aug. | 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 | 05 Aug. - 10 Aug. | 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 | 12 Aug.-17 Aug. | 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 | 19 Aug. -24 Aug. | Comparison test for Convergence at Infinity, An Important Comparison Integral. Convergence of Gamma Integral. |
| 7 | 26 Aug. -31 Aug. | General test for convergence at Infinity-Cauchy’s Test. Abel’s test for Convergence. Dirichlet’s test for convergence. Frullani’s Integral. |
| 8 | 02 Sept.- 07 Sept. | 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. |
| 9 | 09 Sept. -14 Sept. | Metric and Metric Spaces-it’s all related examples and questions. Bounded Sequence and Bounded Functions. |
| 10 | 16 Sept. -21 Sept. | Induced Metric. Semi Metric Space. Diameter of a Subset. Bounded and unbounded Metric Spaces. |
| 11 | 23 Sept. -28 Sept. | 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. |
| 12 | 01 Oct.-05 Oct. | 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 |
| 13 | 07 Oct.-12 Oct. | 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. |
| 14 | 14 Oct. -19 Oct. | 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. |
| 15 | 21 Oct.-23 Oct. | Continuity and uniform Continuity in Metric Spaces- Continuous function and it’s all related theorems. Uniform Continuity and it’s all related theorems. Isometry. |
| 16 | 24 Oct. -30 Oct. | Compactness in Metric Spaces- Covers, Compact set and Compact Metric Space. Bolzano Weierstrass Property (BWP), Sequentially Compact Metric Space. |
| 17 | 04 Nov.-09 Nov. | Countably Compact Spaces and it’s all related theorems.Finite Intersection Property (FIP), Total Boundedness, Continuity and Compactness. |
| 18 | 11 Nov.- 16 Nov. | Connectedness in Metric Spaces- Separated Sets, Connected and Disconnected Sets and it’s all related theorems. Component, Continuity and connectedness. Totally Disconnected Spaces. |
| 19 | 19 Nov. onwards | EXAMINATION |
| 20 | 20 Dec. -31 Dec. | WINTER VACATION |

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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2019-20 (Odd Sem)**  **Class-B.A-1st semester Paper-Algebra** | | |
| **S.No** | **WEEK** | **TOPIC** |
| 1 | 16 July - 20 July | Matrices-It’s type and Basic properties, Solutions of system of Linear equations, Symmetric matrix, skew symmetric matrix, Hermition matrix, skew-Hermition matrix |
| 2 | 22 July -26 July | Rank of a Matrix, Minors & Co factors, Elementary operations, Row-Echelon form, Column-Echelon form, Normal form of a Matrix (Canonical form) Rank of product of two matrices. |
| 3 | 29 July -03 Aug. | Inverse of a matrix by using elementary operations. Linear dependence and independence of row and column matrices and their basic theorems. |
| 4 | 05 Aug. - 10 Aug. | Characteristic equation of a matrix, Eigen values and Eigen vectors. Scalar polynomial and matrix polynomial, Monic Polynomial, Minimal polynomial and minimal equation of a matrix. |
| 5 | 12 Aug.-17 Aug. | Application of matrices to a system of linear equations-System of Non-Homogenous Linear equations, Solution of system of Linear Homogenous equations. |
| 6 | 19 Aug. -24 Aug. | Orthogonal matrix and it’s properties, Unitary matrix and it’s properties and related theorems. |
| 7 | 26 Aug. -31 Aug. | Bilinear and quadratic forms- Linear transformation, Matrix notation of a bilinear form. |
| 8 | 02 Sept.- 07 Sept. | Canonical form of a bilinear form, Factorizable bilinear form, Quadratic forms, Matrix of quadratic form. |
| 9 | 09 Sept. -14 Sept. | Linear transformation of a quadratic form, Diagonalization of a quadratic form, Lagrange’s method of Diagonalization, Factorable quadratic form |
| 10 | 16 Sept. -21 Sept. | Relation between the roots and coefficients of an equation- Division algorithm theorem, Remainder theorem, Synthetic division, Fundamental theorem of algebra. |
| 11 | 23 Sept. -28 Sept. | Find the condition that roots of the given equation satisfy a given relation. |
| 12 | 01 Oct.-05 Oct. | Common roots of two equations, Equal or multiple roots of an equation. |
| 13 | 07 Oct.-12 Oct. | Transformation of equations-Roots with sign changed, reciprocal roots, Roots diminished by a given number, Removal of terms in general. |
| 14 | 14 Oct. -19 Oct. | Transformation of the Cubic and Bi-quadratic. |
| 15 | 21 Oct.-23 Oct. | Transformation in general, equation of squared differences of a cubic. |
| 16 | 24 Oct. -30 Oct. | Solution of Cubic and Bi-quadratic equations- Carden’s methods of solvinf cubic equations. |
| 17 | 04 Nov.-09 Nov. | Descarte’s methods and Ferrari’s methods of solving Bi-quadratic methods. |
| 18 | 11 Nov.- 16 Nov. | Descarte’s rule of sign- Continuation and variation of sign, Leema, Complex roots |
| 19 | 19 Nov. onwards | EXAMINATION |
| 20 | 20 Dec. -31 Dec. | WINTER VACATION |

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| **Teacher’s Name—Satyender Singh Subject-Mathematics**  **LESSON PLAN SESSION 2019-20 (Odd Sem)**  **Class-B.Sc-3rd semester Paper-Advanced Calculus** | | |
| **S.No** | **WEEK** | **TOPIC** |
| 1 | 16 July - 20 July | Continuous functions-Algebra and boundedness of continuous functions, Open sets, closed sets, Intermediate Value theorem, Uniform Continuity it’s related theorems. |
| 2 | 22 July -26 July | Derivative and mean value theorems-Chain rule, Darboux’s theorem, Rolle’s theorem, Lagrange’s mean value theorem, Cauchy’s mean value theorem, Taylor’s theorem with various form of remainder. |
| 3 | 29 July -03 Aug. | Indeterminate forms- L’Hospital rule for evaluation of various types of Indeterminate forms. |
| 4 | 05 Aug. - 10 Aug. | Limit and Continuity of functions of two variables, Algebra of continuous functions. |
| 5 | 12 Aug.-17 Aug. | Partial Differentiation-Partial derivatives of higher order, Homogenous functions, Euler’s theorems on Homogeneous functions, |
| 6 | 19 Aug. -24 Aug. | Total increment and Total Differential, Composite functions, Differentiation of implicit functions, Taylor’s theorem for function of two variables. |
| 7 | 26 Aug. -31 Aug. | Differentiability of functions of two variables-Sufficient condition for differentiability, Young’s theorem, Schwartz’s theorem, Implicit function. |
| 8 | 02 Sept.- 07 Sept. | Maximum and Minimum of function of two variables- Lagrange’s method of Undetermined Multipliers. |
| 9 | 09 Sept. -14 Sept. | Curves in space-Tangent to a curve, Unit vector along the tangent, Equation of a tangent line at a point on a space curve, Cartesian form of equation of tangent line, |
| 10 | 16 Sept. -21 Sept. | Osculating plane or plane of curvature, Analytic function, Order of contact between curve and surface, Equation of tangent plane at any point of the surface f(x,y,z)=0 |
| 11 | 23 Sept. -28 Sept. | Normal line at a point-Principal Normal& Bi-normal, Fundamental unit vectors and fundamental planes, Directions of Principal normal and Bi-normal, Curvature, Torsion, Screw Curvature. |
| 12 | 01 Oct.-05 Oct. | Circle of curvature and spherical curvature-Osculating circle, Radius and centre of circle of curvature and it’s properties. |
| 13 | 07 Oct.-12 Oct. | Osculating sphere or sphere of curvature, Properties of Locus of centre of Spherical curvature. |
| 14 | 14 Oct. -19 Oct. | Involutes and Evolutes- Curvature and Torsion of the Involute, Evolute, Bertrand Curves and it’s properties, |
| 15 | 21 Oct.-23 Oct. | Concept of a surface and Envelopes-Implicit representation of a surface, Class of a surface, Singularity of a surface, |
| 16 | 24 Oct. -30 Oct. | Transformation of parameter, Parametric curves, Tangent plane and normal, Family of surfaces, edge of Regression. |
| 17 | 04 Nov.-09 Nov. | REVISION OF UNIT 1 & 2 |
| 18 | 11 Nov.- 16 Nov. | REVISION OF UNIT 3 & 4 |
| 19 | 19 Nov. onwards | EXAMINATION |
| 20 | 20 Dec. -31 Dec. | WINTER VACATION |