

**Lesson Plan (2022-23)**  
**February 2023 to May 2023**  
**Name of the Assistant Professor- Dr. Amit Kumar**  
**Subject- Mathematics**

<b>Class</b>	<b>B.A. 2<sup>nd</sup> Sem</b>	<b>B.A. 2<sup>nd</sup> Sem</b>	<b>B.A. 4<sup>th</sup> Sem</b>	<b>B.C.A. 3<sup>rd</sup> Sem</b>
<b>Paper/ Month</b>	<b>Ordinary Diff. Equations</b>	<b>Vector Calculus</b>	<b>Sequences and Series</b>	<b>Computer Oriented Statistical Methods</b>
<b>Feb. Section – 1<sup>st</sup></b>	Geometrical meaning of a differential equation, Exact differential equations, integrating factors, First order higher degree equations solvable for x, y, p. Lagrange's equations, Clairauts equations, Equations reducible to Clairaut's form, Singular solutions.	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.	Boundedness of the set of real numbers, least upper bound, greatest lower bound of a set neighbourhoods, interior points, isolated points, limit points, open sets, closed set, interior of a set, closure of a set in real numbers and their properties. Bolzano-Weierstrass theorem. Open covers. Compact sets and Heine-Borel Theorem.	Basic Statistics: Preparing Frequency Distribution Table and Cumulative Frequency, Measure of Central Tendency, Types; Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode. Measure of Dispersion: Range, Quartile Deviation, Mean Deviation, Coefficient of Mean Deviation, S.D. Moments about mean, Moments about any point, Moment about origin, Moment about mean in terms of moment about any point, Moment about any point in terms of moment about mean.
<b>March Section- 2<sup>nd</sup></b>	Orthogonal trajectories in Cartesian co-ordinates and polar coordinates, Self orthogonal family of curves, Linear differential equations with constant coefficients, Homogeneous linear ordinary differential equations, Equations reducible to homogeneous.	Gradient of a scalar point function, geometrical interpretation of grad $\phi$ , character of gradient as a point function. Divergence and curl of vector point function, char. of div f and curl f as point function, examples. Grad., div. & curl of sums and product & their related vector identities. Lap. operator.	Sequence: Real sequences and their convergence, Theorems on limits of sequence, Bounded, and monotonic sequences, Cauchy's sequence, Cauchy general principle of convergence, Subsequences, Subsequential limits. Infinite Series : Convergence and divergence of infinite series, Comparison tests of positive terms infinite series, Cauchy's general principle of convergence of series, Convergence and divergence of geometric series. Hyper Harmonic series or p-series.	Probability Distribution: Random variable, Discrete Random and Continuous Random variable, Probability distribution of a Random Variable, Mathematical Expectation. Types: Binomial, Poisson, Normal Distribution, Mean and variance of Binomial, Poisson and Normal Distribution. Correlation: Introduction, Types, Properties, Methods of Correlation; Karl Pearson's Coefficient of Correlation, Rank Correlation and Concurrent Deviation method, Probable error.

<b>April Section - 3<sup>rd</sup></b>	Linear differential equations of second order. Reduction to normal form. Transformation of the equation by changing the dependent variable/independent variable. Solution by operators of non-homogeneous linear differential equations. Reduction of order of a differential equation. Method of variations of parameters. Method of undetermined coefficients.	Orthogonal curvilinear co-ordinates. Conditions for orthogonality. Fundamental triad of mutually orthogonal unit vectors. Gradient, divergence, curl and laplacian operators in terms of orthogonal curvilinear co-ordinates, cylindrical co-ordinates, spherical co-ordinates.	Infinite series D'Alembert's Ratio test, Raabe's test, Logarithmic test, de Morgan and Bertrand's test, Cauchy's nth root test, Gauss Test, Cauchy's integral test. Cauchy's condensation test.	Regression: Introduction, Aim of Regression Analysis, Types of Regression Analysis, Lines of Regression, Properties of Regression Coefficient and Regression Lines, Comparison with Correlation. Curve fitting: Straight line, Parabolic curve, Geometric curve and Exponential curve. Baye's Theorem in Decision making, Forecasting Techniques.
<b>April/ May Section -4<sup>th</sup></b>	Ordinary simultaneous differential equations. Sol. of simultaneous differential equations involving operators $x(d/dx)$ or $t(d/dt)$ etc. Simultaneous equation of the form $dx/P=dy/Q=dz/R$ . Total differential equations. Condition for $Pdx + Qdy + Rdz = 0$ to be exact. General method of solving $Pdx + Qdy + Rdz = 0$ by taking one variable constant. Method of auxiliary eq <sup>n</sup> .	Vector integration, line integral, surface integral, volume integral Theorem of Gauss, Green, Stokes and problems based on these.	Alternating series Leibnitz's test, absolute and conditional convergence Arbitrary series: Abel's lemma, Abel's test, Dirichlet's test, Insertion and removal of parenthesis, re-arrangement of terms in a series, Dirichlet's theorem, Riemann's Re-arrangement theorem. Pringsheim's theorem (statement only) Multiplication of series, Cauchy product of series, (definitions and examples only), Convergence and absolute convergence of infinite products.	Sample introduction, Sampling: Meaning, methods of Sampling, Statistical Inference: Test of Hypothesis, Types of hypothesis, Procedure of hypothesis testing, Type I and Type II error, one Tailed and two tailed Test, Types of test of Significance; Test of significance of Attribute-Test of no. of success & test of proportion of success, Test of significance for large samples. Test of significance for single mean & Difference of mean, Test of significance for small samples (t-test) - test the significance between the mean of a random sample, between the mean of two independent samples. Chi sq. Test, ANOVA: Meaning, Assumptions, One way classification, ANOVA Table for One- Way data.

