Government General Degree College Chapra
Curriculum Plan under NEP 2020
Department of Mathematics
B.Sc Mathematics (Major Course)
Semester- III

Semester	Period of Semester	Course Code	Name of the Faculty	Paper Name	Brief Description of the Topic	Number of Lecture
SEM- III	July-December	MATH-M-T-03	Biswajit Paul	Real Analysis- I	Review of algebraic and order properties of R. Idea of countable sets, uncountable sets and uncountability of R. Countability of Q. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of R and its equivalent properties. The Archimedean property, density of rational (and irrational) numbers in R, intervals. Intervals, ε-neighbourhood of a point in R, interior points, limit points, isolated points, open set, closed set, union and intersection of open and closed sets. Derived set, closure of a set, interior of a set. Illustrations of Bolzano-Weierstrass theorem for sets. Infinite series, convergence and divergence of infinite series, Cauchy criterion. Tests for convergence: comparison test, limit comparison test, ratio test: D'Alembert's ratio test, Raabe's test, Cauchy's root test, Gauss test, integral test, Cauchy's condensation test with examples.	20 L

					Alternating series, Leibnitz test. Absolute and conditional convergence.	

			Dr. Asim Kumar Das	Real Analysis- I	Sequences, bounded sequence, convergent sequence, limit of a sequence, lim inf, lim sup. Limit theorems. Sandwich theorem. Nested interval theorem Monotone sequences, monotone convergence theorem. Subsequences, divergence criteria. Monotone subsequence theorem (statement only). Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion, Cauchy's 1st and 2nd limit theorem Rolle's theorem. Lagrange's and Cauchy's mean value theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder. Application of Taylor's theorem to convex functions.	20 L
			Dr. Aninda Chakraborty	Real Analysis- I	Limits of functions (ε - δ approach). Sequential criterion for limits. Divergence criteria. Limit theorems, one sided limit. Infinite limits and limits at infinity. Continuous functions, neighbourhood property. Sequential criterion for continuity and discontinuity. Algebra of continuous functions. Continuous functions on an interval, Bolzano's Theorem, intermediate value theorem. Location of roots theorem,	20 L

					preservation of intervals theorem. Uniform continuity, non-uniform continuity criteria, uniform continuity theorem. Differentiability of a function at a point and in an interval, Caratheodory's theorem, Algebra of differentiable functions. Darboux's theorem. Applications of mean value theorem to inequalities and approximation of polynomials. Relative extrema, interior extremum theorem. Taylor's series and Maclaurin's series expansions of exponential and trigonometric functions, $\log(1+x), 1(ax+b)/, (1+x)n.$ Application of Taylor's theorem to inequalities.	
		. . . MATH-SEC-T-03.	Dr. Asim Kumar Das	Programming in C	Brief historical development. Computer generation. Basic structure and elementary ideas of computer systems, operating systems, hardware and software. Positional number systems: Binary, octal, decimal, hexadecimal systems. Binary arithmetic. BIT, BYTE, WORD. Coding of data -ASCII, EBCDIC, etc. Algorithms and flow chart: Important features, ideas about complexities of algorithms. Application in simple problems.	15 L

		.	Dr. Aninda Chakrabarty	Programming in C	Programming language and importance of 'C' programming. Constants, variables and data type of 'C'-Program: Character set. Constants and variables data types, expression, assignment statements, declaration. Operation and expressions: Arithmetic operators, relational operators, logical operators. Decision making and branching: Decision making with if statement, if-else statement, nesting if statement, switch statement, break and continue statement.	15 L
			Biswajit Paul	Programming in C	Control statements: While statement, do-while statement, for statement. Arrays: One-dimension, two-dimensional and multidimensional arrays, declaration of arrays, initialization of one and multi-dimensional arrays. User-defined Functions: Definition of functions, scope of variables, return values and their types, function declaration, function call by value, nesting of functions, passing of arrays to functions, recurrence of function. Application to simple problems: Evaluation of functional values, solution of quadratic equations with real coefficients, approximate sum of convergent infinite series, sorting of real numbers.	15 L

Government General Degree College Chapra
Curriculum Plan under NEP 2020
Department of Mathematics
B.Sc Mathematics (Minor Course)
Semester- III

Semester	**Period of Semester**	**Course Code**	**Name of the Faculty**	**Paper Name**	**Brief Description of the Topic**	**Number of Lecture**
SEM - III	July – December	MATH-MI – T – 02	Biswajit Paul	Calculus & Differential Equation	Real-valued functions defined on an interval, limit and Continuity of a function (using $\varepsilon-\delta$). Algebra of limits. Differentiability of a function. Successive derivative: Leibnitz's theorem and its application to problems of type e^{ax+b}sinx, $e^{ax+b}cosx$, $(ax+b)^n sinx$, $(ax+b)^n cosx$. Partial derivatives. Euler's theorem on homogeneous function of two and three variables. Curvature, rectilinear asymptotes. Indeterminate Forms: L'Hospital's Rule (Statement and Problems only).	15 L
			Dr. Asim Kumar Das	Calculus & Differential Equation	Statement of Rolle's Theorem and its geometrical interpretation. Mean value theorems of Lagrange and Cauchy. Statements of Taylor's and Maclaurin's theorems with Lagrange's and Cauchy's forms of remainders. Taylor's and Maclaurin's infinite series of functions like e^x, sinx, cosx, $(1+x)^n$, log(1+x) with restrictions wherever necessary. Application of the principle of maxima and minima for a function of a single variable. Reduction formulae, derivations and illustrations of reduction formulae of the type $\int sin^n x\,dx$, $\int cos^n x\,dx$, $\int tan^n x\,dx$, $\int sec^n x\,dx$,	15 L

					$\int (logx)^n \, dx,$ $\int sin^n x \, cos^m x \, dx$	
			Dr. Aninda Chakrabarty	Calculus & Differential Equation	First order equations: (i) Exact equations and those reducible to such equations. (ii) Euler's and Bernoulli's equations (Linear). (iii) Clairaut's Equations: General and Singular solutions. Second order differential equation: (i) Method of variation of parameters, (ii) Method of undetermined coefficients. Linear homogeneous equations with constant coefficients, method of variation of parameters, simultaneous differential equations.	20 L

Government General Degree College Chapra
Lesson planCurriculum Plan under NEP 2020
Department of Mathematics
B.Sc Mathematics (Multidisciplinary Course)
Semester- III

Semester	Period of Semester	Course Code	Name of the Faculty	Paper Name	Brief Description of the Topic	Number of Lecture
SEM - III	July - December	MATH-MD – T - 03	Biswajit Paul	Basic Mathematics	Introduction to sets and their representations. The empty set, finite and infinite sets, equal sets, subsets, power set, and Universal set. Venn Diagrams, operations on sets, complement of a set, problems on union and intersection of sets. Polar representation of complex numbers. De Moivre's theorem (without proof) for rational indices and their applications. Introduction and definition of equation. Types of equations. Relation between roots and coefficients. Descartes's rule of signs. Linear and quadratic equations and their solution. Nature of the roots of quadratic equations.	15 L
			Dr. Asim Kumar Das	Basic mathematics.	Definition of a Matrix. Types of Matrices. Elementary operations on Matrices. Determinant of a square matrix (up to third order). Properties of determinants. Cofactors and minor of a determinant. Transpose and Adjoint of a matrix. Symmetric and Skew Symmetric Matrices. Inverse of a matrix. Solution of system of linear equations (up to third order) using matrix	15 L

					inversion method and Cramer's Rule.	
			Dr. Aninda Chakrabarty	Basic Mathematics	Definition and scope of statistics, concepts of statistical population and sample. Data: qualitative and quantitative, discrete and continuous data types, primary and secondary data. Presentation of data: tabular and graphical. Frequency distribution, cumulative frequency distribution and their graphical representations: histogram, frequency polygon, frequency curve, and O-gives. Measures of Central Tendency: mean, weighted mean, median, mode. Measures of Dispersion: range, mean deviation, standard deviation, coefficient of variation, moments, skewness and kurtosis.	15 L