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

Semester	Period of Semester	Course Code	Name of the Faculty	Paper Name	Brief Description of the Topic	Number of Lecture
SEM- IV	January-June	MATH-M-T-04	Biswajit Paul	Differential Equation	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Separable equations and equations reducible to this form. Exact differential equations and integrating factors. Linear equation and Bernoulli equations, special integrating factors and transformations. First order and higher degree differential equations, solvable for x, y and p, Clairaut's Equations: general and singular solutions. Plotting a family of curves which are solutions of second order differential equations. Plotting a family of curves which are solutions of third order differential equations.	20 L

			Dr. Asim Kumar Das	Differential Equation	Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of superposition. Wronskian: its properties and applications, linear homogeneous and non-homogeneous equations of higher order with constant coefficients. Euler's equation, method of undetermined coefficients. Method of variation of parameters. Partial differential equations – Basic concepts and definitions. Mathematical problems. First order equations: classification, construction and geometrical interpretation, Lagrange's method, Charpit's method. Method of characteristics for obtaining general solution of quasi linear equations. Canonical forms of first-order linear equations. Method of separation of variables for solving first order partial differential equations.	30 L

			Dr. Aninda Chakraborty	Differential Equation	Systems of linear differential equations. Types of linear systems., Differential operators. An operator method for linear systems with constant coefficients. Basic Theory of linear systems in normal form. Homogeneous linear systems with constant coefficients, two Equations in two unknown functions. Equilibrium points. Interpretation of the phase plane. Power series solution of a differential equation about an ordinary point, solution	25 L

					about a regular singular point.	
		MATH-M-T-05	Biswajit Paul	Algebra- II	Properties of cosets. Lagrange's theorem and consequences including Fermat's little theorem. External direct product of a finite number of groups. Center of a group, centralizer, normalizer. Normal subgroups. Factor groups. Cauchy's theorem for finite abelian groups. Group homomorphisms, basic properties of homomorphisms. Cayley's theorem. Properties of isomorphisms. First, second and third isomorphism theorems. Automorphism, inner automorphism, automorphism groups, automorphism groups of finite and infinite cyclic groups, applications of factor groups to automorphism groups. Characteristic subgroups, Commutator subgroups and its properties. Properties of external direct products, the	30 L

					group of units modulo n as an external direct product, internal direct products. Fundamental theorem of finite abelian groups. Sylow's theorems and consequences. Cauchy's theorem, Simplicity of A_n for n ≥ 5, non-simplicity tests.	
		.	Dr. Aninda Chakrabarty	Algebra- II	Definition and examples of rings. Properties of rings, Subrings. Integral domains and fields. Characteristics of a ring. Ideal, ideal generated by a subset of a ring. Factor rings. Operations on ideals. Prime and maximal ideals. Ring homomorphisms, properties of ring homomorphisms. Isomorphism theorems I, II and III.	15 L
			Dr. Asim Kumar Das	Algebra-II	Concept of Vector space over a field: Examples, concepts of Linear combinations, linear dependence and independence of a	30 L

					finite number of vectors. Sub- space, concepts of generators and basis of a finite dimensional vector space. Replacement theorem. Extension theorem. Deletion theorem and their applications. Row space, column space. Euclidean Spaces. Orthogonal and orthonormal vectors. Gram-Schmidt process of orthogonalization Linear transformations. Null space. Range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Eigenvalues, eigen vectors and characteristic equation of a matrix. Matric polynomials, Cayley-Hamilton theorem and its use in finding the inverse of a matrix. Diagonalization, Canonical forms.	

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Department of Mathematics
B.Sc Mathematics (Minor Course)
Semester- IV

Semester	Period of Semester	Course Code	Name of the Faculty	Paper Name	Brief Description of the Topic	Number of Lecture
SEM - IV	January- June	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	15 L

					$\int sin^n x\, dx, \int cos^n x\, dx,$ $\int tan^n x\, dx, \int sec^n x\, dx,$ $\int (logx)^n\, dx,$ $\int sin^n x\, cos^m x\, dx$	
			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