

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-I (Honours) (CBCS)

Name of Faculty Members	Topic (As per VU notification)		Topic(As per VU notification)
Dr. S. Manna Associate Professor Head of The Department	C1 (H) Unit-IV: Differential Equation Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors.	P U J A	C1(H)Unit-IV: Differential Equation Separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and Transformations.
	GE-1 Unit-IV: Differential Equation Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors.		GE-1Unit-IV: Differential Equation Separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and Transformations.
Sri. S. Sarkar Assistant Professor	C1(H) Unit-I: Calculus Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax+b}\sin x$, $e^{ax+b}\cos x$, $(ax+b)^n\sin x$, $(ax+b)^n\cos x$, concavity and inflection points, envelopes, asymptotes.	V A C A T I O N	C1(H) Unit-I: Calculus Curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.
	C2(H) Unit-I: Algebra Polar representation of complex numbers, nth roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation of equation.		C2(H)Unit-I:Algebra Theory of equations: Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving $AM \geq GM \geq HM$, Cauchy-Schwartz inequality.
	GE-I Unit-I: Calculus Hyperbolic functions, higher order derivatives, Leibnitz rule and its applications to problems of type $e^{ax+b}\sin x$, $e^{ax+b}\cos x$, $(ax+b)^n\sin x$, $(ax+b)^n\cos x$, concavity and inflection points, envelopes, asymptotes.		GE-I Unit-I: Calculus Curve tracing in Cartesian coordinates, tracing polar Coordinates of standard curves, L'Hospital's rule, applications in business, economics and life sciences.
	C1(H) Unit-II: Calculus Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin nx dx$, $\int \cos nx dx$, $\int \tan nx dx$, $\int \sec nx dx$, $\int (\log x)^n dx$, $\int \sin^n x \sin^m x dx$, parametric equations, parameterizing a curve.		C1(H) Unit-II: Calculus Arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.

Sri. A. De Assistant Professor	C2(H) Unit-III: Algebra Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation $Ax=b$, solution sets of linear systems, applications of linear systems, linear independence. C2(H)Unit-IV: Algebra Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of invertible matrices.	P U J A	C2(H) Unit- IV: Algebra Subspaces of R_n, dimension of subspaces of R_n, rank of a matrix, Eigen values, eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.
Sri. S. Roy Assistant Professor	GE-1Unit-III:Geometry Reflection properties of conics, rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids.		GE-1Unit-III:Geometry Plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing standard quadric surfaces like cone, ellipsoid.
	C1(H)Unit-III: Geometry Reflection properties of conics, rotation of axes and second degree equations, classification of conics using the discriminant, polar equations of conics. Spheres. Cylindrical surfaces. Central conicoids, paraboloids.		C1(H) Unit-III: Geometry Plane sections of conicoids, generating lines, classification of quadrics, illustrations of graphing Standard quadric surfaces like cone, ellipsoid.
	C2 (H) Unit-II: Algebra Equivalence relations. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. GE-I Unit-II: Calculus Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin nx dx$, $\int \cos nx dx$, $\int \tan nx dx$, $\int \sec nx dx$, $\int (\log x)^n dx$, $\int \sin^n x \cos^m x dx$, parametric equations, parameterizing a curve.		C2(H) Unit-II: Algebra Congruence relation between integers. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic. GE-I Unit-II: Calculus Arc length of a curve, arc length of parametric curves, area under a curve, area and volume of surface of revolution, techniques of sketching conics.
		V A C A T I O N	PTM(online)-2nd week of December 2020 Internal Assessment: 3rd week of December 2020 Students' Seminar(online)-2nd week of January 2021

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-II (Honours) (CBCS)

Name of the Faculty Members	Topics (From 26 th April 2021 to 31 th August 2021)
Dr. S. Manna Associate Professor Head of The Department	C4(H)Unit-IV: Vector Calculus Triple product, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions.
Sri. S. Sarkar Assistant Professor	C3(H)Unit-I: Real Analysis Review of algebraic and order properties of $\mathbb{R}$, ϵ -neighborhood of a point in $\mathbb{R}$. Idea of countable sets, uncountable sets and uncountability of $\mathbb{R}$. Bounded above sets, bounded below sets, bounded sets, unbounded sets. Suprema and infima. Completeness property of $\mathbb{R}$ and its equivalent properties. The Archimedean property, density of rational (and Irrational) numbers in $\mathbb{R}$, intervals. Limit points of a set, isolated points, open set, closed set, derived set, illustrations of Bolzano-Weierstrass theorem for sets, compact Sets in $\mathbb{R}$, Heine-Borel Theorem.
	GE-2Unit-I:Algebra Polar representation of complex numbers, n th roots of unity, De Moivre's theorem for rational indices and its applications. Theory of equations: Relation between roots and coefficients, transformation of equation, Descartes rule of signs, cubic and biquadratic equation. Inequality: The inequality involving $AM \geq GM \geq HM$, Cauchy-Schwartz inequality.
Sri. A. De Assistant professor	C3(H)Unit-II: Real Analysis Sequences, bounded sequence, convergent sequence, limit of a sequence, $\liminf$, $\limsup$. Limit theorems. Monotone sequences, monotone convergence theorem. Subsequences, divergence criteria. Monotone subsequence theorem (statement only), Bolzano Weierstrass theorem for sequences. Cauchy sequence, Cauchy's convergence criterion. C3(H)Unit-III: Real Analysis Infinite series, convergence and divergence of infinite series, Cauchy criterion, tests for convergence: comparison test, limit comparison test, ratio test, Cauchy's n th root test, integral test. Alternating series, Leibniz test. Absolute and conditional convergence.
	GE-2Unit-III: Algebra Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation $Ax=b$, solution sets of linear systems, applications of linear systems, linear independence. GE-2Unit-IV:Algebra Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, characterizations of

	invertible matrices. Subspaces of R^n , dimension of subspaces of R^n , rank of a matrix, Eigen values, eigen vectors and characteristic equation of a matrix. Cayley-Hamilton theorem and its use in finding the inverse of a matrix.
Sri. S. Roy Assistant Professor	C4(H)Unit-I:DifferentialEquations Lipschitz condition and Picard's Theorem (Statement only). General solution of homogeneous equation of second order, principle of super position for homogeneous equation, 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. C4(H)Unit-II: Differential Equations 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. C4(H)Unit-III: Differential Equations Equilibrium points, Interpretation of the phase plane Power Series solution of a differential equation about an ordinary point, solution about a regular singular point.
	GE-2Unit-II:Algebra Equivalence relations. Functions, composition of functions, Invertible functions, one to one correspondence and cardinality of a set. Well-ordering property of positive integers, division algorithm, divisibility and Euclidean algorithm. Congruence relation between integers. Principles of Mathematical induction, statement of Fundamental Theorem of Arithmetic.
	Internal Assessment: Last Week of June 2021 PTM(online)-2nd Week of June 2021

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-III (Honours) (CBCS)

Name of Faculty Members	Topic(As per VU notification)		Topic(As per VU notification)
Dr. S. Manna Associate Professor Head Of The Department	SEC-1(H):Logic and Sets:- Unit 1 Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, quantifiers, binding variables and negations. Unit 2 Sets, subsets, set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principal. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set.	P U J A	SEC-1(H):Logic and Sets:- Unit 3 Difference and Symmetric difference of two sets. Set identities, generalized union and intersections. Relation: Product set. Composition of relations, types of relations, partitions, equivalence Relations with example of congruence modulo relation. Partial ordering relations, n-ary relations.
	C7(H): Numerical Methods:- Unit 1 Algorithms. Convergence .Errors: relative, absolute. Round off. Truncation. Unit 2 Transcendental and polynomial equations: Bisection method, Newton's method, secant method, Regula-falsi method, fixed point iteration, Newton-Raphson method Rate of convergence of these methods. Unit 3 System of linear algebraic equations: Gaussian Elimination and Gauss Jordan methods. Gauss Jacobi method, Gauss Seidel method and their convergence analysis. LU decomposition. Unit 4 Interpolation: Lagrange and Newton's methods. Error bounds. Finite difference operators. Gregory Forward and backward difference interpolation. Numerical differentiation: Methods based on interpolations, methods based on finite differences.		C7(H): Numerical Methods:- Unit 5 Numerical Integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3 rd rule, Simpsons 3/8 th rule, Weddle's rule, Boole's Rule. midpoint rule, Composite trapezoidal rule, composite Simpson's 1/3 rd rule, Gauss quadrature formula. The algebraic eigen Value problem: Power method. Approximation: Least square Polynomial approximation. Euler's method, the modified Euler method, Runge-Kutta Methods of orders two and four.
Sri. S. Sarkar Assistant Professor		V A C A T I O N	

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-IV (Honours) (CBCS)

Name of the Faculty Members	Topics(From 19 th April 2021 to 16 th August 2021)
Dr. S. Manna Associate Professor Head of The Department	SEC-2(H):Graph Theory Unit 1 Definition, examples and basic properties of graphs, pseudo graphs, complete graphs, bipartite graphs isomorphism of graphs. Unit 2 Eulerian circuits, Eulerian graph, semi-Eulerian graph, theorems, Hamiltonian cycles, theorems Representation of a graph by matrix, the adjacency matrix, incidence matrix, weighted graph, Unit 3 Travelling salesman's problem, shortest path, Tree and their properties, spanning tree, Dijkstra's algorithm, Warshall algorithm.
Sri. S. Sarkar Assistant Professor	C8(H):Riemann Integration and Series of Function Unit 1 Riemann integration: inequalities of upper and lower sums, Darboux integration, Darboux theorem, Riemann conditions of integrability, Riemann sum and definition of Riemann integral through Riemann sums, equivalence of two definitions. Riemann integrability of monotone and continuous functions, properties of the Riemann integral; definition and integrability of piecewise continuous and monotone functions. Intermediate Value theorem for Integrals; Fundamental theorem of Integral Calculus. Unit 2 Improper integrals. Convergence of Beta and Gamma functions. Unit 3 Pointwise and uniform convergence of sequence of functions. Theorems on continuity, derivability and integrability of the limit function of a sequence of functions. Series of functions; Theorems on the continuity and derivability of the sum function of a series of functions; Cauchy criterion for uniform convergence and Weierstrass M-Test. Unit 4 Fourier series: Definition of Fourier coefficients and series, Reimann Lebesgue lemma, Bessel's inequality, Parseval's identity, Dirichlet's condition .Examples of Fourier expansions and summation results for series. Unit 5 Powerseries, radius of convergence, Cauchy Hadamard theorem. Differentiation and integration of power series; Abel's theorem; Weierstrass approximation theorem.

Sri. A. De Assistant professor	C10(H):Ring Theory and Linear Algebra I Unit 1 Definition and examples of rings, properties of rings, subrings, integral domains and fields, characteristic of a ring. Ideal, ideal generated by a subset of a ring, factor rings, operations on ideals, prime and maximal ideals. Unit 2 Ring homomorphisms, properties of ring homomorphisms. Isomorphism theorems I, II and III, field of quotients. Unit 3 Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces. Unit 4 Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms. Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.
Sri. S. Roy Assistant Professor	C9(H):Multivariate Calculus Unit 1 Functionsofseveralvariables,limitandcontinuityoffunctionsoftwoor more variables Partial differentiation, total differentiability and differentiability, sufficient condition for differentiability. Chain rule for one and two independent parameters, directional derivatives, the gradient, maximal and normal property of the gradient, tangent planes, Extrema of functions of two variables, method of Lagrange multipliers, constrained optimization problems Unit 2 Double integration over rectangular region, double integration over non-rectangular region, Double integrals in polar co-ordinates, Triple integrals, triple integral over a parallelepiped and solid regions. Volume by triple integrals, cylindrical and spherical co- ordinates. Change of variables in double integrals and triple integrals. Unit 3 Definition of vector field, divergence and curl. Line integrals, applications of line integrals: mass and work. Fundamental theorem for line integrals, conservative vector fields, independence of path. Unit 4 Green's theorem, surface integrals, integrals over parametrically defined surfaces. Stoke's theorem, The Divergence theorem.
	Internal Assessment: 3rd Week of June 2021 PTM(online)-2nd Week of June 2021

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-V (Honours) (CBCS)

Name of Faculty Members	Topic(As per VU notification)		Topic(As per VU notification)
Dr. S. Manna Associate Professor Head Of The Department	DSE-1(H):Linear Programming Unit 1 Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, Two-phase method. Big-M method and their comparison. Unit 2 Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual. problem and its mathematical formulation ,Northwest-Corner method, least cost Method and Vogel approximation method for determination of starting basic solution, algorithm for solving transportation problem, assignment problem and its mathematical formulation, Hungarian method for solving assignment problem.	P U J A V A C A T I O N	DSE-1(H):Linear Programming Unit 3 Game theory: formulation of two person zero sum games, solving two person zero sum games, games with mixed strategies, graphical solution procedure, linear programming solution of games.
	DSE-2(H):Probability and Statistics Unit 1 Sample space, probability axioms, real random variables(discrete and continuous),cumulative Distribution function, probability mass/density functions, mathematical expectation, moments, Moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential. Unit 2 Joint cumulative distribution function and its properties, joint probability density functions, Marginal and conditional distributions, Expectation of function of two random variables, Conditional expectations, independent random variables, bivariate normal distribution, Correlation coefficient, joint moment generating function(jmgf)and calculation of covariance (from jmgf),linear regression for two variables.		DSE-2(H):Probability and Statistics Unit 3 Chebyshev's inequality, Statement and interpretation of (weak)law of large numbers and strong law of large numbers. Central limit theorem for independent and identically distributed random variables with finite variance ,Markov chains, Chapman-Kolmogorov equations, classification of states. Unit 4 Random Samples, Sampling Distributions, Estimation of parameters, Testing of hypothesis.

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-VI (Honours) (CBCS)

Name of the Faculty Members	Topics(From 5 th April 2021 to 2 nd August 2021)
Sri. S. Sarkar Assistant Professor	C13(H):Metric Spaces Unit 1 Metric spaces: sequences in metrics paces, Cauchy sequences. Complete metric spaces, Cantor's theorem. Unit 2 Continuous mappings, sequential criterion and other characterizations of continuity. Uniform continuity. Connectedness, connected subsets of R. Compactness: Sequential compactness, Heine-Borel property, totally bounded spaces, finite intersection property, and continuous functions on compact sets. Homeomorphism. Contraction mappings. Banach fixed point theorem and its application to ordinary differential equation. Unit 3 Limits, limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability.
	DSE-4:Mathematical Modelling Unit 1 Power series solution of Bessel's equation and Legendre's equation, Laplace transform and inverse transform, application to initial value problem up to second order. Unit 2 Monte Carlo simulation modelling: simulating deterministic behavior (area under a curve, volume under a surface), generating random numbers: middle square method, linear congruence, queuing models: harbor system, morning rush hour, Over view of optimization modelling. Linear programming model: geometric solution algebraic solution, simplex method, sensitivity analysis

Sri. A. De Assistant professor	C14(H):Ring Theory and Linear Algebra II Unit 1 Polynomial rings over commutative rings, division algorithm and consequences, principal ideal domains, factorization of polynomials, reducibility tests, irreducibility tests, Eisenstein criterion, and unique factorization in $\mathbb{Z}[x]$. Divisibility in integral domains, irreducible, primes, unique factorization domains, Euclidean domains. Unit 2 Dual spaces, dual basis, double dual, transpose of a linear transformation and its matrix in the dual basis, annihilators. Eigen spaces of a linear operator, diagonalizability, invariant subspaces and Cayley-Hamilton theorem, the minimal polynomial for a linear operator, canonical forms. Unit 3 Inner product spaces and norms, Gram-Schmidt orthogonalisation process, orthogonal complements, Bessel's inequality, the adjoint of a linear operator. Least squares approximation, minimal solutions to systems of linear equations. Normal and self-adjoint operators. Orthogonal projections and Spectral theorem.
Sri. S. Roy Assistant Professor	C13(H):Complex Analysis Unit 3 Limits, limits involving the point at infinity, continuity. Properties of complex numbers, regions in the complex plane, functions of complex variable, mappings. Derivatives, differentiation formulas, Cauchy-Riemann equations, sufficient conditions for differentiability. Unit 4 Analytic functions, examples of analytic functions, exponential function, logarithmic function, trigonometric function, derivatives of functions, and definite integrals of functions. Contours, Contour integrals and its examples, upper bounds for moduli of contour integrals. Cauchy-Goursat theorem, Cauchy integral formula. Unit 5 Liouville's theorem and the fundamental theorem of algebra. Convergence of sequences and series, Taylor series and its examples. Unit 6 Laurent series and its examples, absolute and uniform convergence of power series.

	DSE-3(H):Number Theory Unit 1 Linear Diophantine equation, prime counting function, statement of prime number theorem, Goldbach conjecture, linear congruences, complete set of residues. Chinese remainder theorem, Fermat's little theorem, Wilson's theorem. Unit 2 Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mobius Inversion formula, the greatest integer function, Euler's phi-function, Euler's theorem, reduced set of residues, some properties of Euler's phi-function. Unit 3 Order of an integer modulo n, primitive roots for primes, composite numbers having primitive roots, Euler's criterion, the Legendre symbol and its properties, quadratic reciprocity, quadratic congruences with composite moduli. Public key encryption, RSA encryption and decryption, the equation $x^2 + y^2 = z^2$, Fermat's Last theorem.
	Internal Assessment: 1st Week of June 2021 PTM(online)-2nd Week of June 2021

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-I (General) (CBCS)

Name of Faculty Members	Topic (As per VU notification)	P U J A V C A T I O N	Topic (As per VU notification)
Sri. A. De Assistant Professor	DSC-1A(CC-1):Differential Calculus Limit and Continuity (ϵ and δ definition), Types of discontinuities, Differentiability of functions, Successive differentiation, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions.		DSC-1A(CC-1): Differential Calculus Tangents and normals, Curvature, Asymptotes, Singular points, Tracing of curves.
Sri. S. Roy Assistant Professor	DSC-1A(CC-1):Differential Calculus Parametric representation of curves and tracing of parametric curves, Polar coordinates and tracing of curves in polar coordinates. Rolle's theorem, Mean Value theorems, Lagrange and Cauchy theorems. Taylor's theorem with Lagrange's and Cauchy's forms of remainder, Power series and its convergences.		DSC-1A(CC-1):Differential Calculus Taylor's series, Maclaurin's series of $\sin x$, $\cos x$, e^x , $\log(1+x)$, $(1+x)^m$, Maxima and Minima, Indeterminate forms.
			PTM(online)-2nd week of December 2020 Internal Assessment: 3rd week of December 2020 Students' Seminar(online)-2nd week of January 2021

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-II (General) (CBCS)

Name of the Faculty Members	Topics (From 26 th April 2021 to 31 th August 2021)
Sri. A. De Assistant professor	DSC-1B(CC-2):Differential Equations First order exact differential equations. Integrating factors, rules to find an integrating factor. First order higher degree Equations solvable for x,y,p. Methods for solving higher-order differential equations. Basic theory of linear differential equations, Wronskian, and its properties. Solving A differential equation by reducing its order. Linear Homogenous equations with constant coefficients, Linear non-homogenous equations, The method of variation of parameters, The Cauchy-Euler equation, Simultaneous Differential equations, Total differential equations.
Sri. S. Roy Assistant Professor	DSC-1B(CC-2):Differential Equations Order and degree of partial differential equations, Concept of linear and non-linear partial differential equations, Formation of first order partial differential equations, Linear partial differential equation of first order, Lagrange's method, Charpit's method. Classification of second order partial differential equations into elliptic, parabolic and hyperbolic through illustrations only.
Internal Assessment: Last Week of June 2021 PTM(online)-2nd Week of June 2021	

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-III (General) (CBCS)

Name of Faculty Members	Topic(As per VU notification)	P U J A V C A T I O N	Topic(As per VU notification)
Sri. S. Sarkar Assistant professor	DSC-1C(G):Real Analysis Finite and infinite sets, examples of countable and uncountable sets. Real line, bounded sets, suprema and infima, completeness property of $\mathbb{R}$, Archimedean property of $\mathbb{R}$, intervals. Concept of cluster points and statement of Bolzano-Weierstrass theorem. Real Sequence, Bounded sequence, Cauchy convergence criterion for sequences. Cauchy's theorem on limits, order preservation and squeeze theorem monotone sequences and their convergence (monotone convergence theorem without proof). Infinite series. Cauchy convergence criterion for series, positive term series, geometric series, comparison test, convergence of p-series, Root test, Ratio test, alternating series, Leibnitz's test (Tests of Convergence without proof).		DSC-1C(G): Real Analysis Definition and examples of absolute and conditional Convergence Series. Sequences and series of functions, Pointwise and uniform convergence. μ -test, M-test, Statements of the results about uniform convergence and integrability and differentiability of functions, Power series and radius of convergence.
Sri. A. De Assistant professor	SEC-I(G):Theory of Equations General properties of polynomials, Graphical representation of polynomials, maximum and minimum values of a polynomial, General properties of equations, Descarte's rule of signs positive and negative rule, Relation between the roots and the coefficients of equations. Symmetric functions, Applications of symmetric function of the roots.		SEC-I(G):Theory of Equations Transformation of equations. Solutions of reciprocal and binomial equations. Algebraic solutions of the cubic and biquadratic equations. Properties of the derived functions.
			PTM(online)-2nd week of December 2020 Internal Assessment: 3rd week of December 2020 Students' Seminar(online)-2nd week of January 2021

JHARGRAM RAJ COLLEGE
DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-IV (General) (CBCS)

Name of the Faculty Members	Topics(From 19 th April 2021 to 16 th August 2021)
Dr. S. Manna Associate Professor Head Of The Department	SEC-2(G):Integral Calculus Integration by Partial fractions, integration of rational and irrational functions. Properties of definite integrals. Reduction formulae for integrals of rational, trigonometric, exponential and logarithmic functions and of their combinations. Evaluation of areas and lengths of curves in the plane, valuation of volumes and surfaces of solids of revolution. Double and Triple integrals.
Sri. A. De Assistant professor	DSC-1D:Algebra Definition and examples of groups, examples of abelian and non-abelian groups, the group Z_n of integers under addition modulo n and the group $U(n)$ of units under multiplication modulo n. Cyclic groups from number systems, complex roots of unity, circle group, the general linear group $GL_n(R)$, groups of symmetries of (i) an isosceles triangle, (ii) an equilateral triangle, (iii) a rectangle, and (iv) a square, the permutation group $Sym(n)$, Group of quaternions. Subgroups, cyclic subgroups, the concept of a subgroup generated by a subset and the commutator sub group of group, examples of subgroups including the center of a group. Cosets, Index of subgroup, Lagrange's theorem, order of an element, Normal subgroups: their definition, examples, and characterizations, Quotient groups. Definition and examples of rings, examples of commutative and non-commutative rings: rings from number systems, Z_n the ring of integers modulo n, ring of real quaternions, rings of matrices, polynomial rings, and rings of continuous functions. Subrings and ideals, Integral domains and fields, examples of fields: Z_p, Q, R, and C. Field of rational functions.
Internal Assessment: 3rd Week of June 2021 PTM(online)-2nd Week of June 2021	

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DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-V (General) (CBCS)

Name of Faculty Member	Topic(As per VU notification)	P U J A V C A T I O N	Topic(As per VU notification)
Sri. A. De Assistant Professor	DSE-1A: Linear Algebra Vector spaces, subspaces, algebra of subspaces, quotient spaces, linear combination of vectors, linear span, linear independence, basis and dimension, dimension of subspaces.		DSC-2(G): Linear Algebra Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation, algebra of linear transformations. Isomorphisms. Isomorphism theorems, invertibility and isomorphisms, change of coordinate matrix.
Sri. S. Roy Assistant Professor	SEC-3(G): Number Theory Division algorithm, Lagrange's theorem, linear Diophantine equation, fundamental theorem of arithmetic, prime counting function, statement of prime number theorem, Goldbach conjecture, binary and decimal representation of integers.		SEC-3(G): Number Theory Linear congruences, complete set of residues. Number theoretic functions, sum and number of divisors, totally multiplicative functions, definition and properties of the Dirichlet product, the Mobius Inversion formula, the greatest integer function, Euler's phi-function.
			PTM(online)-2nd week of December 2020 Internal Assessment: 3rd week of December 2020 Students' Seminar(online)-2nd week of January 2021

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DEPARTMENT OF MATHEMATICS
Academic Calendar for the Session 2020-2021
B.Sc. Semester-IV (General) (CBCS)

Name of the Faculty Members	Topics(From 19 th April 2021 to 16 th August 2021)
Dr. S. Manna Associate Professor Head Of The Department	DSE-1(H):Linear Programming Introduction to linear programming problem. Theory of simplex method, graphical solution, convex sets, optimality and unboundedness, the simplex algorithm, simplex method in tableau format, introduction to artificial variables, Two-phase method. Big-M method and their comparison. Duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual.
Sri. A. De Assistant professor	SEC-4(G): Probability and Statistics Sample space, probability axioms, real random variables(discrete and continuous),cumulative Distribution function, probability mass/density functions, mathematical expectation, moments, Moment generating function, characteristic function, discrete distributions: uniform, binomial, Poisson, geometric, negative binomial, continuous distributions: uniform, normal, exponential. Joint cumulative distribution function and its properties, joint probability density functions, Marginal and conditional distributions, Expectation of function of two random variables, Conditional expectations, independent random Variables.
Internal Assessment: 1st Week of June 2021 PTM(online)-2nd Week of June 2021	