COURSE OUTCOME – UNDERGRADUATE MATHEMATICS HONOURS

(CBCS SYSTEM)

NAME OF THE PROGRAMME: B.Sc(HONS)

YEAR OF INTRODUCTION: 2018

COURSE OUTCOME	
COURSE NAME	Course outcomes
Semester-I CC-I (Calculus, Geometry and Differential equation) FM-75	After successful completion of CC-I, a student will be able to • Define and give examples of basic concepts points of inflection, envelopes, asymtotes, higher order derivative and curve tracing. • Apply the concept of reduction formulae to evaluate integral. • Classify the conic section by the use of discriminant. • Find the solution of exact differential equations, linear differential equations and Bernouli diefferential equations.
Semester-I CC-II (Algebra) FM-75	After successful completion of CC-II, a student will be able to • Define and supply examples of linear transformation, eigen value, eigen vector, arithmetic mean and geometric mean. • Find the nature of roots of algebraic equations by the use of Descartes rule of sign. • State the following theorems and outline their proofs: De Moivre's theorem, fundamental

	theorem of arithmetic, Cayley-Hamilton theorem. • Obtain inverse of matrices using Caylay-Hamilton theorem.
Semester-II CC-III (Real Analysis) FM-75	After successful completion of CC-III, a student will be able to • Define and give example of countable set, uncountable set, bounded set, unbounded set, sequence and series of real numbers. • Find the limit of sequence using definition. • Distinguish between convergent and divergent sequence and series.
Semester-II CC-IV (Differential equation and vector calculus) FM-75	After successful completion of CC-IV, a student will be able to • Define and give example of homogeneous , non-homogeneous differential equation, Wronskian, system of linear differential equations, vector triple dot and cross product. • Compute limits, derivatives and integration of vector valued function.
Semester-III CC-V (Theory of reall functions and introduction of the metric space) FM-75	After successful completion of CC-V, a student will be able to • Define and give example of limit of functions, extrema, relative extrema, metric space, open and closed balls.

	• Determine the continuity and differentiability of functions defined on subsets of the real line • State the following theorems and outline their proofs: intermediate value theorem, rolle's theorem, mean value theorem, Taylor's theorem and Darboux's theorem.
Semester-III CC-VI (Group theory –I) FM-75	After successful completion of CC-VI, a student will be able to • Define and give example of binary operation, algebraic structure, group, normal subgroup, center of a group, group homomorphism. • State the following theorems and outline their proofs: Lagrange's theorem, Cauchy's theorem for finite abelian group, fist, second and third isomorphism theorem for group. • Find the subgroup, center, normal subgroup for a given group
Semester-III CC-VII (Riemann integration and series of functions) FM-75	After successful completion of CC-VII, a student will be able to • Define and give example of Riemann integration, beta function, gama function, sequence and series of functions, fourier series and power series.

	• State the following theorems and outline their proofs: Fundamental theorem if integral calculus, theorems on continuity , derivability and integrability of the limit function of a sequence of functions, weierstrass approximation theorem.
Semester-III SE-I (Logic and sets or C++) FM-75	After successful completion of SE-I, a student will be able to • Analyse and demonstrate examples of truth table, conjunction, disconjunction, sets, venn diagram, finite and infinite set. • Find the difference and symmetric difference of sets, union, intersection of sets.
Semester-IV CC-VIII (Multivariate calculus) FM-75	After successful completion of CC-VIII, a student will be able to • Analyse and demonstrate the examples of function of several variables, double integration over rectangular region, double integration in polar coordinates, triple integration, line integrations. • Represent vectors analytically and geometrically and compute dot and cross products

	• Evaluate double and triple integrals for area and volume • Differentiate vector fields • State the following theorems and outline their proofs: Green's theorem, Stoke's theorem and Divergence theorem • Find the divergence and curl of vector field
Semester-IV CC-IX (Ring theory and linear algebra -I) FM-75	After successful completion of CC-IX, a student will be able to • Define and give example of rings, subring, ideal, characteristics of ring, ring homomorphism, vector space, linear span, linearly dependence and independence, linear transformation. • Apply the concept of isomorphism to isomorphic. • State the following theorems and outline their proofs: first, second and third ring isomorphism theorem. • Find the matrix of linear transformation, rank and nullity of transformation.
Semester-IV CC-X (Metric space and complex theory) FM-75	After successful completion of CC-X, a student will be able to • Analyse and demonstrate the example of connectedness, separation, compactness, fixed point, analytic functions.

	• State the following theorems and outline their proofs: Banach fixed point theorem, Cauch-gaursat theorem, Cauchy integral theorem. • Define and analyze limits and continuity for complex functions
Semester-IV SEC-II (Graph theory or operating system linux) FM-75	After successful completion of SEC-II, a student will be able to • Describe and demonstrate basic properties of graphs, pseudo graphs, complete graphs, bipartite graph, trees and forests • Describe and apply the relationship between the properties of a matrix representation of a graph and the structure of the graph
Semester-V CC-XI(Group theory -II) FM-75	After successful completion of CC-XI, a student will be able to • Analyse and demonstrate the example of automorphism, inner automorphism,

	external direct product,group action, stabilizer and kernels. • State the following theorems and outline their proofs: generalized Caylay's theore, index theorem, syllow's theorem. • Find class equation for a given finite group.
Semester-V CC-XII (Numerical methods – lab) FM- 75	After successful completion of CC-XII, a student will be able to • Derive numerical methods for approximating the solution of problems • Analyze the error incumbent in any such numerical approximation • Find the solution of integration by Trapezoidal rule, simsons 1/3 rd and 1/8 th rule.
Semester-V DSE-I (Probability and statistics or Linear programming) FM -75	After successful completion of DSE-I, a student will be able to • Define and give example of sample space, event, experiment, probability mass function, probability density function, expectation, variance, moment, joint commulative distribution function, joint probability density function, random variable. • Find the moment generating function for a given probability density function.

	• Compute expectation, variance, conditional expectation. • Apply the concept of conditional probability to show independent event.
Semester-V DSE-II (Number theory or mechanics) FM-75	After successful completion of DSE-II, a student will be able to • Analyse and demonstrate the concept of Diophantine equation, congruenc, divisibility and prime. • State the following theorems and outline their proofs: Fermat's little theorem, fermat's two square theorem and chinese –remaider theorem. • Find the solution of linear congruenc.
Semester-VI CC-XIII(Ring theory and linear algebra –II) FM- 75	After successful completion of XIII, a student will be able to • Define and give example of ploynomialrings, principle ideal doamain, unique factorization domain, dual basis, dual space, annihilator,inner product space, orthogonal complement andadjoint of a linear operator. • Compute inner products and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization • Identify self-adjoint transformations and apply the spectral theorem and

	orthogonal decomposition of inner product spaces • Find the annihilator of given subset or subspace of inner product space • Find the eigen space of eigen value of a given linear transformation
Semester-VI CC-XIV(Partial differential equations and applications) FM-75	After successful completion of XIV, a student will be able to • familiar with the modeling assumptions and derivations that lead to PDEs, • Recognize the major classification of PDEs and the qualitative differences between the classes of equations • competent in solving linear PDEs using method of characteristics, method of separation of variable. • Derive theheat equation, wave equation and laplace equation
Semester-VI DSE-III(Point set topology or Boolean algebra and automata theory) FM-75	After successful completion of DSE-III, a student will be able to • Define and illustrate the concept of topological spaces, subspace, continuous functions and homeomorphisms. • Define and illustrate the concept of product topology and quotient topology

	• Prove a selection of theorems concerning topological spaces, continuous functions, product topologies • Define connectedness and compactness, and prove a selection of related theorems
Semester-VI DSE-IV (Differential geometry or theory of equations) FM-75	After successful completion of DSE-IV, a student will be able to • Analyse and demonstrate the concept of maximum , minimum values of polynomial, symmetric function, reciprocal function and equation. • State the following theorems and outline their proofs: strums theorem and Newton's theorem • Apply the concept of Descartes rule of sign to investigate the possible number of positive and negative root of algebraic equation

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COURSE OUTCOME	
COURSE NAME	**COURSE OUTCOME**
Semester-1 GE-I (Calculus, geometry and Differential equation) (Group A) FM-75	After successful completion ofGE-I, a student will be able to • Define and give examples ofbasic concepts points of inflection, envelopes, asymtotes, higher order derivative and curve tracing. • Apply the concept of reduction formulae to evaluate integral. • Classify the conic section bythe use of discriminant. • Find the solution of exact differential equations, linear differential equations and Bernouli differentialequations.
Semester-1 GE-I (Group Theory) (Group B) FM-75	After successful completion ofGE-I, a student will be able to • Define and give example ofbinary operation, algebraic structure, semigroup, group,normal subgroup, center of a group, group homomorphism. • State the following theorems and outline their proofs: Lagrange's

	theorem,Cauchy's theorem for finite abelian group, fist, second and third isomorphism theorem for group. Find the subgroup, center, normal subgroup for a givengroup

Semester-2 GE-II(Algebra) (Group A) FM-75	After successful completion ofGE-II, a student will be able to • Define and supply examplesof eigen value and eigen vector of matrix, arithmetic mean and geometric mean. • Find the nature of roots of algebraic equations by theuse of Descartes rule of sign. • State the following theorems and outline theirproofs: De Moivre's theorem, fundamental theorem of arithmetic, Cayley-Hamilton theorem. • Obtain inverse of matricesusing Caylay-Hamilton theorem. • Solve system of linear equations and find solutionset of linear system.
Semester-2 GE-II(Differential equation and Vector calculus) (Group B) FM-75	After successful completion ofGE-II, a student will be able to • Define and give example ofhomogeneous , non-homogeneous differential equation, Wronskian, system of linear differentialequations, vector triple dot and cross product.

	• Compute limits, derivativesand integration of vector valued function.
Semester-2 GE-II (Numerical methods) (Group C) FM-75	
Semester-3 GE-III (Calculus, geometry and Differential equation) (Group A) FM-75	After successful completion of GE-III, a student will be able to • Define and give examples ofbasic concepts points of inflection, envelopes, asymtotes, higher order derivative and curve tracing. • Apply the concept of reduction formulae to evaluate integral. • Classify the conic section bythe use of discriminant. Find the solution of exact differential equations, lineardifferential equations and Bernouli differential equations.

Semester-3 GE-III (Group Theory) (Group B) FM-75	After successful completion of GE-III, a student will be able to • Define and give example ofbinary operation, algebraic structure, semigroup, group,normal subgroup, center of a group, group homomorphism. • State the following theorems and outline their proofs: Lagrange's theorem,Cauchy's theorem for finite abelian group, fist, second and third isomorphism theorem for group. • Find the subgroup, center, normal subgroup for a given group

Semester-4 GE-IV (Algebra) (Group A) FM-75	After successful completion of GE-IV, a student will be able to • Define and supply examplesof eigen value and eigen vector of matrix, arithmetic mean and geometric mean. • Find the nature of roots of algebraic equations by theuse of Descartes rule of sign. • State the following theorems and outline theirproofs: De Moivre's theorem, fundamental theorem of arithmetic, Cayley-Hamilton theorem. • Obtain inverse of matrices using Caylay-Hamilton theorem. • Solve system of linear equations and find solutionset of linear system.
Semester-4 GE-IV (Differential equation and Vector calculus) (Group B) FM-75	After successful completion of GE-IV, a student will be able to • Define and give example of homogeneous , non-homogeneous differential equation, Wronskian, system of linear differential equations, vector triple dot and cross product. Compute limits, derivatives and integration of vector valued function.