Hiralal Bhakat College
Nalhati, Birbhum

Details of

Program Specific Outcomes (PSOs)
and
Course Outcomes (COs)

Department: Mathematics
Program Name: B.Sc (General) under CBCS of BU

Program Specific Outcomes (PSOs)

PSO1: A student should be able to recollect fundamental mathematical concepts and should be able to display knowledge of conventions such as notations, terminology.

PSO2: A learner should be able to follow the patterns involved in mathematical reasoning and get a relational comprehension of mathematical concepts and related structures.

PSO3: In mathematics, a student should be able to do an objective analysis and forecast of quantitative data.

PSO4: A student should be able to analyze a problem, and identify and define the mathematical approaches required for its solution.

PSO5: It should be possible for a student to construct and formulate mathematical arguments and models, as well as gain solid knowledge and comprehension in more complex areas of mathematics.

PSO6: A student should be able to work both independently and cooperatively in group projects and team building exercises.

PSO7: A student should possess the mathematical aptitude, problem-solving abilities, artistic ability, and communication skills required for a variety of career paths.

Course Outcomes (COs)

Semester	Course Type	Course Title & Code	Course Outcomes (COs)
1st Semester	CC	Differential Calculus (BMG1CC1A)	Students will be able to * conceptualize the basic concepts on limit, continuity and derivatives of function. * apply notion of derivative in mean value theorem and also in higher order derivatives * determine the equations of tangents, normal, asymptotes and to be able to find the tracing of curves.
2nd Semester	CC	Differential Equations (BMG2CC1B)	Students will be able to * check the exactness of differential equations and be able to solve them. * solve higher order linear as well as homogeneous differential equations. * find general solution of simultaneous differential equations. * find order, degree and be capable to classify the linearization of PDEs * solve first order partial differential equation using Lagrange's and Charpit's methods.
3rd Semester	CC	Real Analysis (BMG3CC1C)	Students will be able to * learn about the real sets, different properties, theorems on set theory. * study the convergence of sequence and infinite series of real numbers using various theorems and rules. * use the concept on sequence of function and series of function and their convergence.
	SEC	Logic and sets (BMG3SEC11)	Students will be able to * understand the concept of logic and formulate the different logical propositions. * apply the idea of logical equivalences, predicates and quantifiers. * gather the knowledge on set theory and applications of properties. * know the concept of different types of relations and theorems.
		Analytical Geometry (BMG3SEC12)	Students will be able to * sketch the different types of curves. * classify the characteristics of general equation of second degree. * illustrate of graphing standard quadratic surfaces.
		Integral Calculus (BMG3SEC13)	Students will be able to * determine the value of integrals using different formula. * use the methods of reduction formula for integrals. * determine areas, volumes and surfaces of curves in plane.
Semester	Course	Course Title & Code	Course Outcomes (COs)

	Type		
4th Semester	CC	Algebra (BMG4CC1D)	Students will be able to * learn fundamental properties and mathematical tools such as closure, associative, identity, inverse and commutative. * study the definition, theorems and properties on Cyclic, Zn, U(n), GLn(n, R) etc groups. * know the various theorems and properties of subgroups, Cyclic subgroups, Cosets, normal subgroups etc. * understand the structure of ring, field with their properties and theorems.
	SEC	Vector Calculus (BMG4SEC21)	Students will be able to * apply the differentiation of vector functions and their properties * learn about Gradient, divergence and curl on vector function.
		Theory of equations (BMG4SEC22)	Students will be able to * understand the general properties of polynomials and equations. * apply Descarte's rule of sign for finding roots. * discuss the symmetric functions and their applications * solve reciprocal and binomial equations. * use the properties of derived functions.
		Number Theory (BMG4SEC23)	Students will be able to * learn about the problem of linear Diophantine equation, prime counting function, statement of prime number theorem etc. * understand on 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.
5th Semester	DSE	Matrices (BMG5DSE1A1)	Students will be able to * learn the definitions, operations, properties of real matrices. * determine the rank of matrices and solutions of linear homogeneous and non-homogeneous equations using properties of matrices. * find eigenvalues, eigenvectors and their characteristics.
		Mechanics (BMG5DSE1A2)	Students will be able to * find the conditions of equilibrium of a particle and of coplanar forces acting on rigid body. * study the problems on Work, Power and energy of particle. * understand the law of centre of force and harmonic motion of particle.
Semester	Cours	Course Title &	Course Outcomes (COs)

	e Type	Code	
5th Semester		Linear Algebra (BMG5DSE1A3)	Students will be able to * understand the algebraic structure of vector space, subspaces, linear combinations, basis and dimensions and their properties. * learn the rules of linear transformations, rank and nullity of linear transformation. * use the concept of dual space, double dual, isomorphism and their theorems.
	SEC	Probability and Statistics (BMG5SEC31)	Students will be able to * apply the concept of probability and theorems in different real life problems. * understand the different probability distribution functions. * apply the concept of mathematical expectations, moments, moment generating function and characteristic functions. * learn about joint cumulative distribution functions and properties.
		Mathematical Finance (BMG5SEC32)	Students will mainly be able to * study the basic principle of arbitrage and risk aversion. * understand the interest, inflation, net present value bonds, and return. * compare of NPV and IRR. * design portfolio, portfolio return and diversification.
		Mathematical Modeling (BMG5SEC33)	Students will be able to * apply the concept of modeling on mixture problem, free damped motion, electric circuit problems etc. * construct and analyze the models on traffic flow. * understand the law of conversion and conduction of heat in solid.
Semester	Course	Course Title & Code	Course Outcomes (COs)

	Type		
6th Semester		Complex Analysis (BMG6DSE1B2)	Students will be able to * learn the definition, basic properties of complex numbers, and complex functions and its geometrical interpretation. * apply the theorems on limit, continuity and derivatives of complex functions. * use the concept of analytic function and its applications in different problems. * understand the application of Cauchy Integral formula, Cauchy-Goursat integral formula and contour integrals.
		Linear Programming (BMG6DSE1B3)	Students will be able to * construct real life problems to mathematical models and its applications * calculate optimal solution of LPP using graphical methods and simplex methods. * formulate the dual problem of LPP and to use its properties.
	SEC	Boolean Algebra (BMG6SEC41)	Students will be able to * learn basic properties on ordered set, duality principle, lattices as ordered set, lattices as algebraic structure and homomorphism. * study the structure of Boolean algebra, properties. * apply Quinn-McCluskey method, Karnaugh diagram and switching circuits.
		Transportation and Game Theory (BMG6SEC42)	Students will be able to * solve the transportation problem by north-west corner method, least corner method and Vogel's approximation method. * determine the cost matrix of assignment problem using Hungarian method. * apply of basic ideas of Game theory and determine the value of two-person zero sum game by mixed strategy etc.
		Graph Theory (BMG6SEC43)	Students will mainly be able to * define basic properties of graph theory. * identify various graphs: pseudo graphs, complete graph, weighted graph etc. * solve travelling salesman problems. * apply the algorithm of Dijkstra's algorithm and Floyd-Warshall algorithm.

Mapping of
Program Specific Outcomes (PSOs)
&
Course Outcomes (COs)

CO details	Program Specific Outcomes (PSOs) details						
Course Title	PSO1 (A student should be able to recollect fundamental mathematical concepts and should be able to display knowledge of conventions such as notations, terminology.)	PSO2 (A learner should be able to follow the patterns involved in mathematical reasoning and get a relational comprehension of mathematical concepts and related structures.)	PSO3 (In mathematics, a student should be able to do an objective analysis and forecast of quantitative data.)	PSO4 (A student should be able to analyze a problem, and identify and define the mathematical approaches required for its solution.)	PSO5 (It should be possible for a student to construct and formulate mathematical arguments and models, as well as gain solid knowledge and comprehension in more complex areas of mathematics.)	PSO6 (A student should be able to work both independently and cooperatively in group projects and team building exercises.)	PSO7 (A student should possess the mathematical aptitude, problem-solving abilities, artistic ability, and communication skills required for a variety of career paths.)
Differential Calculus	√		√	√		√	
Differential Equations	√	√		√	√		√
Real Analysis	√	√	√	√		√	√
Logic and sets	√		√		√		√
Analytical Geometry	√	√		√		√	√
Integral Calculus	√		√	√	√	√	
Algebra	√	√	√		√		√
Vector Calculus	√	√		√		√	
Theory of equations	√		√		√		√
Number Theory	√	√		√	√		√
Matrices	√	√	√		√	√	
Mechanics	√		√		√		√
Linear	√	√		√		√	

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Probability and Statistics	√		√	√	√		
Algebra	√	√		√		√	√
Mathematical Finance	√	√	√			√	√
Mathematical Modeling	√		√	√	√		√
Numerical Methods	√	√	√		√		√
Complex Analysis	√	√		√	√	√	
Linear Programming	√		√		√		√
Boolean Algebra	√	√		√		√	√
Transportation and Game Theory	√		√		√		√
Graph Theory	√	√		√		√	√

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