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DURGAPUR GOVERNMENT COLLEGE
DEPARTMENT OF Mathematics
Programme Outcome, Course Outcome and Program Specific Outcome

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Aims of the Bachelors' Degree Program in Mathematics [As per the UGC LOCF Template (2019)]

1. Create deep interest in learning mathematics.
2. Develop broad and balanced knowledge and understanding of definitions, concepts, principles and theorems.
3. Familiarize students with suitable tools and techniques of mathematical analysis to handle issues and problems in mathematics and related sciences.
4. Enhance the ability of learners to apply knowledge and skills acquired by them during the programme to solve specific theoretical and applied problems in mathematics.
5. Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in mathematics and its allied areas on multiple disciplines concerned with mathematics.
6. Encourage the students to develop a range of generic skills helpful in employment, internships and social activities.

Program Learning Outcomes [As per the UGC LOCF Template (2019)]

1. Bachelor's degree in mathematics is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations and several other branches of mathematics. This also leads to the study of related areas like computer science and statistics. Thus, this programme helps learners in building a solid foundation for higher studies in mathematics.
2. The skills and knowledge gained have intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilized in modeling and solving real-life problems.
3. Students undergoing this programme learn to logically question assertions, recognise patterns, and distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from the knowledge and insight of others. This helps them to learn behave responsibly in a rapidly changing interdependent society.
4. Students completing this programme will be able to present mathematics clearly and precisely, make vague ideas precise by formulating them in the language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians (students from other discipline).
5. Completion of this programme will also enable the learners to join teaching profession in primary and secondary schools.
6. This programme will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

Course Outcomes
Course Details: CORE COURSE-01
Course Name: Calculus, Geometry & Differential Equations
Course Code: BSCHMTMC101 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)

Knowledge on the followings
1. Understand various kinds of standard functions and graphs, techniques of integrations and limits.
2. Understand the concepts on three-dimensional geometry.
3. Understand the genesis of ordinary differential equations.
4. Understand the various techniques of getting exact solutions of solvable first order differential equations and linear differential equations of higher order.

Course Details: CORE COURSE-02
Course Name: Algebra
Course Code: BSCHMTMC102 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the importance of roots of real and complex polynomials and learn various methods of obtaining roots.
2. Employ De Moivre's theorem in a number of applications to solve numerical problems.
3. Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.
4. Find eigenvalues and corresponding eigenvectors for a square matrix.

Course Details: CORE COURSE-03
Course Name: Real Analysis
Course Code: BSCHMTMC201 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. To understand properties of the real line R and to define sequence in terms of functions from R to a subset of R.
2. Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
3. Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.

Course Details: CORE COURSE-04
Course Name: Differential Equations and Vector Calculus
Course Code: BSCHMTMC202 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Learn the Picard's method of obtaining successive approximations of solutions of first order ordinary differential equations.
2. Know how to solve linear homogeneous and non-homogeneous equations of higher order with constant coefficients.

3. Understand the system of linear differential equations and the solution techniques.
4. Understand the theory and applications of vector analysis.

Course Details: CORE COURSE-05
Course Name: Theory of Real Functions & Introduction to Metric Space
Course Code: BSCHMTMC301 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Grasp the various aspects of real functions like existence and importance of limits of functions at a certain point of the domain, continuity and differentiability of real functions.
2. Understand several standard concepts of metric spaces and their properties like openness, closedness, completeness.

Course Details: CORE COURSE-06
Course Name: Group Theory I
Course Code: BSCHMTMC302 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Link the fundamental concepts of groups and symmetries of geometrical objects.
2. Explain the significance of the notions of cosets, normal subgroups, and factor groups.
3. Analyze consequences of Lagrange's theorem.
4. Learn about structure preserving maps between groups and their consequences.

Course Details: CORE COURSE-07
Course Name: Numerical Methods & Numerical Methods Lab
Course Code: BSCHMTMC303 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the problem solving skills using numerical methods,
2. Handle large system of equations, non-linearity and and that are often impossible to solve analytically,
3. Solve differential equations by numerical methods,
4. Develop problem solving skills using computer programming,
5. Acquire knowledge of computer language,
6. Solve different numerical problems using C language.

Course Details: CORE COURSE-08
Course Name: Riemann Integration and Series of Functions
Course Code: BSCHMTMC401 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)

Knowledge on the followings

1. Understand the theory and concepts of Riemann integration
2. Understand the applications of the fundamental theorems of integration.
3. Understand the convergence of series of functions.

Course Details: CORE COURSE-09
Course Name: Multivariate Calculus
Course Code: BSCHMTMC402 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the basic concepts and know the basic techniques of differential and integral calculus of functions of several variables.
2. Solve problems involving maxima and minima, line integral and surface integral, and vector calculus.
3. Develop mathematical maturity to undertake higher level studies in mathematics and related fields

Course Details: CORE COURSE-10
Course Name: Ring Theory and Linear Algebra I
Course Code: BSCHMTMC403 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Know the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields.
2. Understand the concepts of vector spaces, subspaces, bases, dimension and their properties.
3. Relate matrices and linear transformations, compute eigen values and eigen vectors of linear transformations, isomorphisms.

Course Details: CORE COURSE-11
Course Name: Partial Differential Equations and Applications
Course Code: BSCHMTMC501 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Apply a range of techniques to solve first & second order partial differential equations
2. Model physical phenomena using partial differential equations such as the heat and wave equations.

Course Details: CORE COURSE-12
Course Name: Ring Theory and Linear Algebra II
Course Code: BSCHMTMC502 (Honours)

1. Understand the polynomial rings, dual spaces, eigen spaces, canonical forms.
2. Understand the further idea of inner product spaces and linear transformations.

Course Details: CORE COURSE-13
Course Name: Metric Spaces and Complex Analysis
Course Code: BSCHMTMC601 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand several standard concepts of metric spaces and their properties like openness, closedness, completeness, Bolzano-Weierstrass property, compactness, and connectedness.
2. Identify the continuity of a function defined on metric spaces and homeomorphisms.
3. Visualize complex numbers as points of R and stereographic projection of complex plane on the Riemann sphere.
4. Understand the significance of differentiability and analyticity of complex functions leading to the Cauchy-Riemann equations.
5. Learn the role of Cauchy-Goursat theorem and Cauchy integral formula in evaluation of contour integrals.
6. Apply Liouville's theorem in fundamental theorem of algebra.
7. Understand the convergence, term by term integration and differentiation of a power series.
8. Learn Taylor and Laurent series expansions of analytic functions, classify the nature of singularity, poles and residues and application of Cauchy Residue theorem.

Course Details: CORE COURSE-14
Course Name: Mechanics
Course Code: BSCHMTMC602 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Familiarize with subject matter, which has been the single centre, to which were drawn mathematicians, physicists, astronomers, and engineers together.
2. Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body.
3. Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight.
4. Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.

Course Details: SEC
Course Name: Logic and Sets
Course Code: BSCHMTMSE301 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand about truth table, different propositions, predicates and quantifiers, various operations between two sets and logical equivalences.

Course Details: SEC
Course Name: Programming Language in C
Course Code: BSCHMTMSE302 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Acquire knowledge of different computer languages.
2. Understand basic structures, characters, identifier etc. in C language.
3. Write flow chart and corresponding C-program for solving numerical and decision making problems.

Course Details: SEC
Course Name: Graph Theory
Course Code: BSCHMTMSE401 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Appreciate the definition and basics of graphs along with types and their examples.
2. Understand the Eulerian circuits, Eulerian graphs, Hamiltonian cycles, representation of a graph by matrix.
3. Relate the graph theory to the real-world problems.

Course Details: SEC
Course Name: Object Oriented Programming in C++
Course Code: BSCHMTMSE402 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the basic characteristics of object oriented programming languages, different components and structures in C++ programming language.
2. Understand and apply the programming concepts of C++ which is important for mathematical investigation and problem solving.
3. Use mathematical libraries for computational objectives.
4. Represent the outputs of programs visually in terms of well formatted text and plots.

Course Details: DSE
Course Name: Linear Programming and Game Theory
Course Code: BSCHMTMDSE501 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Analyze and solve linear programming models of real life situations.
2. Provide graphical solution of linear programming problems with two variables, and illustrate the concept of convex set and extreme points.
3. Solve linear programming problems using simplex method.
4. Learn techniques to solve transportation and assignment problems.
5. Solve two-person zero sum game problems.

Course Details: DSE
Course Name: Group Theory II
Course Code: BSCHMTMDSE502 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the automorphism, inner automorphism, automorphism groups, automorphism groups.
2. Understand group action, Sylow's theorems and Cauchy's theorem.

Course Details: DSE
Course Name: Point Set Topology
Course Code: BSCHMTMDSE503 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand countability of sets, various topological definitions and proofs and it's connection to metric spaces.

Course Details: DSE
Course Name: Probability and Statistics
Course Code: BSCHMTMDSE504 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand distributions in the study of the joint behaviour of two random variables.
2. Establish a formulation helping to predict one variable in terms of the other that is correlation and linear regression.
3. Understand central limit theorem, which establish the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell shaped curve.

Course Details: DSE
Course Name: Portfolio Optimization

Course Code: BSCHMTMDSE505 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Explain technical terminologies essential for the understanding of portfolio optimization including financial markets, investment objectives, types of assets, asset return, risk, short selling and liquidity.
2. Discriminate between different sources of risk and demonstrate the concept of diversification.
3. Demonstrate workings of two asset and multi-asset portfolio optimization and describe how to make optimal capital allocation and portfolio choice decisions on real-data set by hand.
4. Demonstrate measures to evaluate a portfolio's performance.
5. Demonstrate essential concepts of capital asset pricing model.

Course Details: DSE
Course Name: Boolean Algebra and Automata Theory
Course Code: BSCHMTMDSE506 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand Boolean algebra and Boolean functions, logic gates, switching circuits and their applications.
2. Apply a number of proof techniques to theorems in language design.
3. Develop a clear understanding of undesirability.
4. Understand the equivalence between Non-deterministic Finite State Automata and Deterministic Finite State Automata.

Course Details: DSE
Course Name: Number Theory
Course Code: BSCHMTMDSE601 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Learn about some important results in the theory of numbers including the prime number theorem, Chinese remainder theorem, Wilson's theorem and their consequences.
2. Learn about number theoretic functions, modular arithmetic and their applications.
3. Familiarise with modular arithmetic and find primitive roots of prime and composite numbers.
4. Know about open problems in number theory, namely, the Goldbach conjecture and twin-prime conjecture.
5. Apply public crypto systems, in particular, RSA.

Course Details: DSE
Course Name: Industrial Mathematics
Course Code: BSCHMTMDSE602 (Honours)

1. Understand the applications of mathematics in the field of industrial manufacturing.
2. Understand the theories behind the industrial inventions.
3. Understand the theories of the inverse problem, X-Rays and CT Scan.

Course Details: DSE
Course Name: Mathematical Modelling
Course Code: BSCHMTMDSE603 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Assess and articulate what type of modeling techniques are appropriate for a given physical system,
2. Construct a mathematical model of a given physical system and analyze it,
3. Make predictions of the behavior of a given physical system based on the analysis of its mathematical model.

Course Details: DSE
Course Name: Differential Geometry
Course Code: BSCHMTMDSE604 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Explain the basic concepts of tensors.
2. Understand role of tensors in differential geometry.
3. Learn various properties of curves including Frenet-Serret formulae and their applications.
4. Know the Interpretation of the curvature tensor, Geodesic curvature, Gauss and Weingarten formulae.
5. Understand the role of Gauss's Theorema Egregium and its consequences.
6. Apply problem-solving with differential geometry.

Course Details: DSE
Course Name: Bio Mathematics
Course Code: BSCHMTMDSE605 (Honours)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Grasp the idea of various bio-mathematical models and techniques which will help them to tackle physical world problems.

Course Details: DSE
Course Name: Astronomy
Course Code: BSCHMTMDSE606 (Honours)

Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Ability to comprehend astronomical scales and understand basic concepts of positional, astronomy like astronomical coordinate system and measurement of distances, time and temperature and radius of star.
2. Understand basic parameters of stars like brightness, radiant flux, luminosity, magnitude, orbits, spectral classification. H-R diagram,
3. Understand astronomical techniques, various types of optical telescopes and telescope mountings. Various types of detectors and their use with telescopes.
4. Understanding Physics of sun and solar system: photosphere, chromosphere, corona, solar activity. Solar MHD, helioseismology, solar system and its origin.

Course Details: GE-1
Course Name: **Differential Calculus**
Course Code: BSCHMTMGE101 **(GENERIC)**
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Assimilate the notions of limit of a sequence and convergence of a series of real numbers.
2. Calculate the limit and examine the continuity of a function at a point.
3. Understand the consequences of various mean value theorems for differentiable functions.
4. Sketch curves in Cartesian and polar coordinate systems.

Course Details: GE-2
Course Name: Differential Equations and Vector Calculus
Course Code: BSCHMTMGE201 (GENERIC)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Learn various methods to find the solutions of ordinary differential equations.
2. Understand the central concepts in multivariable analysis, including space curves; directional derivative; gradient; multiple integrals; line and surface integrals; vector fields; divergence, curl and flux.

Course Details: GE
Course Name: Algebra
Course Code: BSCHMTMGE301 (GENERIC)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the concepts of different types of groups, rings and field.
2. Understand the basic concepts of group actions and their applications.
3. Understand the concepts of vector spaces, sub-spaces, linear dependence and linear independence of a finite set of vectors.

Course Details: GE

Course Name: Real Analysis
Course Code: BSCHMTMGE401 (GENERIC)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings
1. Understand about sets in R, sequences, series of functions and infinite series.

Course Details: CC-1(1)
Course Name: Differential Calculus
Course Code: BSCPMTMC101 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings
1. Understand limit, continuity, differentiability and partial differentiation.
2. Learn Rolle 's Theorem, mean value theorems, maxima and minima, indeterminate forms and different applications of calculus.

Course Details: CC-1(2)
Course Name: Differential Equations and Vector Calculus
Course Code: BSCPMTMC201 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings
1. Learn various methods to find the solutions of ordinary differential equations.
2. Understand the central concepts in vector calculus; vector-valued functions; gradient, divergence and curl.

Course Details: CC-1(3)
Course Name: Algebra
Course Code: BSCPMTMC301 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings
1. Understand the concepts of different types of groups, rings and field.
2. Solve a system of non-homogeneous linear equations.
3. Understand the concepts of real vector space, sub-space and linear dependence and independence of a finite set of vectors.

Course Details: CC-1(4)
Course Name: Real Analysis
Course Code: BSCPMTMC401 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings
1. Understand about sets in R, sequences, series of functions and infinite series.

Course Details: DSE
Course Name: Mechanics
Course Code: BSCPMTMDSE501 (Program)

Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the basic concepts of mechanics with examples and applications of real world problems.

Course Details: DSE
Course Name: Numerical Analysis
Course Code: BSCPMTMDSE502 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the problem solving skills using numerical methods,
2. Handle large system of equations, non-linearity and and that are often impossible to solve analytically,
3. Solve differential equations by numerical methods.

Course Details: DSE
Course Name: Linear Programming Problems
Course Code: BSCPMTMDSE601 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Analyze and solve linear programming models of real life situations.
2. Provide graphical solution of linear programming problems with two variables, and illustrate the concept of convex set and extreme points.
3. Solve linear programming problems using simplex method.
4. Learn techniques to solve transportation and assignment problems.

Course Details: DSE
Course Name: Probability & Statistics
Course Code: BSCPMTMDSE602 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand the basic concepts on probability and statistics.
2. Understand the various probability distributions and their applications, mathematical expectation, moments.

Course Details: SEC
Course Name: Mathematical Logic and Sets
Course Code: BSCPMTMSE301 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand about different propositions of logic, truth table, logical operators, various operations and relations related to sets.

Course Details: SEC

Course Name: Boolean Algebra
Course Code: BSCPMTMSE401 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Understand Boolean algebra and Boolean functions, logic gates, switching circuits and their applications.
2. Apply a number of proof techniques to theorems in language design.

Course Details: SEC
Course Name: Number Theory
Course Code: BSCPMTMSE501 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Learn Lame's theorem, linear Diophantine equation, congruences, Goldbach conjecture, Euler's phi-function.

Course Details: SEC
Course Name: Graph Theory
Course Code: BSCPMTMSE601 (Program)
Course Outcome ((Prescribed in Kazi Nazrul University Syllabus (2020-2021) after introduction of LOCF within the CBCS)
Knowledge on the followings

1. Appreciate the definition and basics of graphs along with types and their examples.
2. Understand the Eulerian circuits, Eulerian graphs, Hamiltonian cycles, representation of a graph by matrix.
3. Relate the graph theory to the real-world problems.

Under-graduate Honours Course

Mathematics is taught in all 06 Semesters in accordance to the CBCS Curriculum of Kazi Nazrul University. The nature of these Mathematics Courses, and their respective marks with credit points are listed below:

Semester	Course Details	Course Name	Course Code	Full Marks	Credit
I (HONS)	CC- 1	Calculus, Geometry & Differential Equations	BSCHMTMC101	50	06
	CC-2	Algebra	BSCHMTMC102	50	06
II (HONS)	CC- 3	Real Analysis	BSCHMTMC201	50	06
	CC- 4	Differential Equations and Vector Calculus	BSCHMTMC202	50	06
III (HONS)	CC- 5	Theory of Real Functions & Introduction to Metric Spaces	BSCHMTMC301	50	06
	CC- 6	Group Theory I	BSCHMTMC303	50	06

	CC- 7	Numerical Methods & Numerical Methods Lab	BSCHMTMC303	50	06
	SEC-1	Logic and Sets	BSCHMTMSE301	50	02
		Programming Language in C	BSCHMTMSE302		
IV (HONS)	CC- 8	Riemann Integration and Series of Functions	BSCHMTMC401	50	06
	CC- 9	Multivariate Calculus	BSCHMTMC402	50	06
	CC- 10	Ring Theory and Linear Algebra I	BSCHMTMC403	50	06
	SEC-2	Graph Theory	BSCHMTMSE401	50	02
		Object Orineted Programming in C++	BSCHMTMSE402		
V (HONS)	CC- 11	Partial Differential Equations and Applications	BSCHMTMC501	50	06
	CC- 12	Ring Theory and Linear Algebra II	BSCHMTMC502	50	06
	DSE-1	Linear Programming and Game Theory	BSCHMTMDSE501	50	06
		Group Theory II	BSCHMTMDSE502		
		Point Set Topology	BSCHMTMDSE503		
	DSE-2	Probability and Statistics	BSCHMTMDSE504	50	06
		Portfolio Optimization	BSCHMTMDSE505		
		Boolean Algebra and Automata Theory	BSCHMTMDSE506		
VI (HONS)	CC- 13	Metric Spaces and Complex Analysis	BSCHMTMC601	50	06
	CC- 14	Mechanics	BSCHMTMC602	50	06
	DSE-3	Number Theory	BSCHMTMDSE601	50	06
		Industrial Mathematics	BSCHMTMDSE602		
		Mathematical Modeling	BSCHMTMDSE603		
	DSE-4	Differential Geometry	BSCHMTMDSE604	50	06
		Bio Mathematics	BSCHMTMDSE605		
		Astronomy	BSCHMTMDSE606		
I (GENERIC)	GE-1	Differential Calculus	BSCHMTMGE101	50	06
II (GENERIC)	GE-2	Differential Equations and Vector Calculus	BSCHMTMGE201	50	06
III (GENERIC)	GE-3	Algebra	BSCHMTMGE301	50	06
IV (GENERIC)	GE-4	Real Analysis	BSCHMTMGE401	50	06
I (PROGRAM)	CC-1(1)	Differential Calculus	BSCPMTMC101	50	06

II (PROGRAM)	CC-2(1)	Differential Equations and Vector Calculus	BSCPMTMC201	50	06
III (PROGRAM)	CC-3(1)	Algebra	BSCPMTMC301	50	06
	SEC-1	Mathematical Logic and Sets	BSCPMTMSE301	50	02
IV (PROGRAM)	CC-4(1)	Real Analysis	BSCPMTMC401	50	06
	SEC-2	Boolean Algebra	BSCPMTMSE401	50	02
V (PROGRAM)	SEC-3	Number Theory	BSCPMTMSE501	50	02
	DSE	Mechanics	BSCPMTMDSE501	50	06
		Numerical Analysis	BSCPMTMDSE502		
VI (PROGRAM)	SEC-4	Graph Theory	BSCPMTMSEC601	50	02
	DSE	Linear Programming Problems	BSCPMTMDSE601	50	06
		Probability and Statistics	BSCPMTMDSE602		