Deptt. of Maths
PO-CO Mapping

Programme Outcome

PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Analytical thinking	Thinking ability to help inviduals in solving problems of Maths.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Information & Digital Literacy	Ability to find,evaluate and communicate information. Also ability to seek out multiple information and evaluating the quality of information by digital literacy.
PO-7	Skill Enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO-8	Self directed Learning	Ability to learn mathematics in a self directed teaching environment.
PO-9	Life long learning	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life.
PO-10	Experiental Learning	Ability to identify problem ,use constructive reasoning to make viable arguments & applying mathematics in real life problem.
PO-11	Employability Option	Capable to establish independent startup/innovation center etc.

Courses and Course Code under UG Programme

(CBCS under NEP – 20)

2023 -2024

Semester	DSC code	Credit	Course Title	DSEC Code	Credit	Course Title
First	DSCMAT 01	04	Calculus			
Second	DSCMAT 02	04	Algebra			
Third	DSCMAT 03	04	Calculus and Algebra	DSEMAT 01	04	Discrete Mathematics
Fourth	DSCMAT 04	04	Real Analysis	DSEMAT 02	04	Mechanics
Fifth	DSCMAT 05	04	Linear Algebra	DSEMAT 03	04	Numerical Methods
Sixth	DSCMAT 06	04	Metric Space	DSEMAT 04	04	Probability & Statistics

B.Sc. Semester I

DSC-Calculus

Course Outcome

After completing course, students are able to

1. Calculate the limit and examine the continuity and understand the geometrical interpretation of differentiability.
2. Understand the consequences of various mean value theorems.
3. Draw curves in Cartesian and polar coordinate systems.
4. To solve problems related to vector integration.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓	✓	✓
PO_3	✓	✓	✓	✓
PO_4	✓	✓	✓	✓
PO_5			✓	✓
PO_6	✓	✓		
PO_7				
PO_8	✓	✓	✓	✓
PO_9			✓	
PO_{10}	✓	✓		✓
PO_{11}				

B.Sc. Semester II

DSC-Algebra

Course Outcome

After completing course, students are able to

1. To acquire techniques in solving equations with the help of theory of equations.
2. To understand the concepts of algebra.
3. To be familiar with group theory, ring, integral domain, field and make their fundamental strong.
4. Analyze the consequences of Lagranges theorem.
5. Learn about structure preserving g maps between groups and their consequences.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}					

B.Sc. Semester III

DSC- III

Course Outcome

Calculus & Algebra

After completing course, Students are able to

1. To understand the concepts of Partial differentiation.

2. To be familiar with group theory, ring, integral domain, field and make their Fundamental strong.

3. Analyze the consequences of Lagrange theorem.

4. Learn about structure preserving g maps between groups and their consequences.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓	✓	
PO_3	✓		✓	✓
PO_4	✓	✓		✓
PO_5				✓
PO_6	✓	✓		
PO_7				
PO_8	✓	✓	✓	
PO_9				
PO_{10}	✓	✓		✓
PO_{11}				

B.Sc. Semester IV

DSC- IV

Course Outcome

Real Analysis

After completing course, Students are able to

1. To understand basic properties of real number system such as least upper bound property and

   Order property.

2. Realize importance of bounded, Convergent, Cauchy and monotonic sequences of real numbers, find their limit superior and limit inferior.

3. Understand basic properties of infinite series.

4. Learn about Riemann integrability of bounded functions and algebra of R- integrable functions.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓	✓	✓
PO_3	✓	✓	✓	✓
PO_4	✓	✓	✓	✓
PO_5			✓	✓
PO_6	✓	✓	✓	✓
PO_7			✓	✓
PO_8	✓	✓	✓	✓
PO_9				
PO_{10}	✓	✓	✓	✓
PO_{11}				

B.Sc. Semester V

DSC- V

Course Outcome

Linear Algebra

After completing course, Students are able to

1. Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix using rank.

2. Find eigen values and corresponding eigen vectors for a square matrix.

3. Understand real vector spaces , subspaces , basis ,dimension and their properties.

4. Learn about properties of linear transformation and isomorphism theorems.

5.Understand the concept of polynomials and their prime factorization.

6. Find canonical form of linear transformation.

7.Obtain various variants of diagonalisation of linear transformations.

8. Apply Cauchy-Schwarz inequality for deriving metric on inner product spaces and obtain orthonormal basis using Gram-Schmidt orthogonalisation.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5			
PO_1	✓	✓	✓	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓	✓	✓	✓
PO_5				✓				
PO_6	✓	✓				✓	✓	✓
PO_7					✓			
PO_8	✓	✓	✓			✓	✓	✓
PO_9			✓					
PO_{10}	✓	✓		✓		✓	✓	✓
PO_{11}				✓	✓			

B.Sc. Semester VI

DSC- VI

Course Outcome

Metric Spaces

After completing course, Students are able to

1. Understand the concept of metric ,distance, convergence, completeness, compactness, connected.
2. Apply these concepts to key classess of spaces.
3. Learn to analyze mapping between spaces.
4. Learn to use metric space methods to solve problems of science and engineering.
5. Attain background for advanced courses in real analysis, functional analysis and topology.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓			✓

B.Sc. Semester III
DSE- Discrete Mathematics
Course Outcome

After completing course, students are able to

1. Learn about partially ordered sets, lattices and their types.
2. Understand Boolean Algebra and Boolean Functions, Logic gates ,switching circuit and their application
3. Solve real life problem using finite state machine.
4. Assimilate various graph theoretic concepts and familiarize with their applications.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓		✓	
PO_3	✓		✓	✓
PO_4	✓		✓	✓
PO_5				✓
PO_6	✓	✓		
PO_7				
PO_8	✓	✓	✓	
PO_9				
PO_{10}	✓	✓		✓
PO_{11}	✓	✓		

B.Sc. Semester IV

DSE- Mechanics

Course Outcome

After completing course, students are able to

i) Familiarize with subject matter, which has been the single centre, to which were drawn mathematicians, physicists, astronomers, and engineers together.

ii) 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 forcesacting on a rigid body.

iii) Determine the centre of gravity of some materialistic systems and discuss theequilibrium of a uniform cable hanging freely under its own weight.

iv) 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.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓			✓

B.Sc. Semester V

DSE- Numerical Methods

Course Outcome

After completing course, students are able to

1. Obtain numerical solutions of algebraic and transcendental equations.
2. Find numerical solutions of system of linear equations and to check the Accuracy of the solutions.
3. Learn about various interpolating and extrapolating methods to find numericalsolutions.
4. Solve initial and boundary value problems in differential equations using numericalmethods.
5. Apply various numerical methods in real life problems.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9	✓		✓		✓
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓			✓

B.Sc. Semester VI

DSE- Probability & Statistics

Course Outcome

After completing course, students are able to

i) Understand the basic concepts of probability.

ii) Appreciate the importance of probability distribution of random variables and toknow the notion of central tendency.

iii) Establish the joint distribution of two random variables in terms their relation and regression.

iv) Understand central limit theorem which shows that the empirical frequencies of somany natural populations exhibit normal distribution.

v) Study entropy and information theory in the framework of probabilistic models.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9	✓		✓		✓
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓			✓

B.Sc.(Old Semester System)

B.Sc. Semester I
Calculus and Algebra I
Course Outcome

Students are able to

1. To understand the ideas and concept of calculus and facility in solving standard examples.

2. To understand the ideas of limits and continuity and an ability to calculate with them and apply them for functions of one variable.

3. To solve problem using expansion of functions.

4. To understand the concepts of algebra and trigonometry.

5. To acquire techniques in solving equations with the help of theory of equations.

6. To understand the ideas of vector analysis and geometry in solving standard examples.

7. To be familiar with physical interpretation of divergence and curl of a vector.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5	CO_6	CO_7
PO_1	✓	✓	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓	✓	✓
PO_3	✓	✓	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓	✓	✓
PO_5				✓			
PO_6	✓	✓				✓	✓
PO_7					✓		
PO_8	✓	✓	✓			✓	✓
PO_9			✓				
PO_{10}	✓	✓		✓		✓	✓
PO_{11}						✓	

B.Sc. Semester II

Calculus and Algebra II

Course Outcome

Students are able to

1. To solve problem related to definite integral.
2. To able to familiar with curve tracing
3. To make the student acquire sound knowledge of techniques in solving differential equations.
4. To understand the concepts of algebra.
5. To be familiar with group theory, ring, integral domain, field and make their fundamental strong.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓	✓	✓	✓
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		✓
PO_{10}	✓	✓		✓	
PO_{11}			✓	✓	✓

B.Sc. Semester III

Advanced Calculus and Differential Equations-I

Course Outcome

Students are able to

1. To gain proficiency in calculus computations.
2. To gain knowledge of sequences, series and their convergence.
3. To understand the ideas of limits and continuity and an ability to calculate with them and apply them for functions of two variables.
4. To acquire knowledge of techniques insolving partial differential equations.
5. To understand the ideas of Legendre, Bessel equations in solving standard differential equations and apply them.
6. To understand the ideas of differential equation and facility in solving standard equations.
7. To get knowledge about the Laplace and inverse Laplace transform.
8. To familiarize the student with the applications of Laplace transformation in solving linear differential equations.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5	CO_6	CO_7	CO_8
PO_1	✓	✓	✓	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓	✓	✓	✓
PO_5				✓	✓	✓	✓	✓
PO_6	✓	✓						
PO_7					✓			
PO_8	✓	✓	✓					
PO_9			✓				✓	✓
PO_{10}	✓	✓		✓				✓
PO_{11}	✓	✓	✓	✓	✓	✓		

B.Sc. Semester IV
Advanced Calculus and Differential Equations-II

Course Outcome

Students are able to

1. To gain proficiency in calculus computations.
2. To acquire knowledge of techniques in solving partial differential equations.
3. To understand the ideas of differential equation and facility in solving standard equations.
4. To get knowledge about the Laplace and inverse Laplace transform.
5. To familiarize the student with the applications of calculus of variation in solving differential equations.
6. To acquire knowledge of techniques in solving partial differential equations.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5	CO_5
PO_1	✓	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓	✓
PO_3	✓	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓	✓
PO_6	✓	✓				
PO_7					✓	✓
PO_8	✓	✓	✓			
PO_9			✓			
PO_{10}	✓	✓		✓		
PO_{11}	✓	✓	✓	✓	✓	✓

B.Sc. Semester V

Analysis And Abstract Algebra-I

Course Outcome

Students are able to

1. To gain proficiency in computation of real analysis.

2. To understand the concept of real analysis and series.

3. To understand the idea of complex analysis and ability to calculate with them.

4. To develop aspect of Linear transformation & Jordan form.

5. Distinguish the concept of Homomorphism, Automorphism & Isomorphism,

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3				✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓	✓	✓	✓

B.Sc. Semester VI

Analysis and Abstract Algebra-II

Course Outcome

Students are able to

1. To gain proficiency in computation of real analysis.

2. To understand the concept of real analysis and series.

3. Distinguish the concept of Homomorphism, Automorphism & Isomorphism,.

4.To introduce the concepts of metric space to the students and to make them understand various familiar cocept of real analysis with the help of metric space.

5. To understand the concept of compactness and connectedness with respect to metric space and to study some useful properties of continuous function.

6.Distinguish the concept of Homomorphism, Automorphism & Isomorphism,.

7. To understand the concept of Inner Product space, orthganalization & Gram-Schmidt Process.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5	CO_6	CO_7
PO_1	✓	✓	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓	✓	✓
PO_3	✓	✓	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓	✓	✓
PO_5			✓	✓		✓	✓
PO_6	✓	✓					
PO_7					✓		
PO_8	✓	✓	✓				
PO_9			✓			✓	✓
PO_{10}	✓	✓		✓			
PO_{11}	✓	✓	✓	✓	✓	✓	✓

M.Sc. I Sem.

Course Code	Course Type	Course (Paper/Subjects)
MSM 101	**CCC**	**Advanced Abstract Algebra I**
MSM 102	**CCC**	**Real Analysis I**
MSM 103	**CCC**	**Topology I**
MSM S01	**OSC**	**Social Outreach And Internship & Entrepreneurship**
MSM A01	ECC/CB	CONSTITUTIONALISM & INDIAN POLITICAL SYSTEM
MSM A02	ECC/CB	Advanced Discrete Mathematics (I)
MSM A03	ECC/CB	Differential Geometry
MSM A04	ECC/CB	Mathematical Programming
MSM A05	**ECC/CB**	**Complex Analysis- I**

M.Sc. I Sem.

Paper I – Advanced Abstract Algebra –I

Course Outcome

After Completing the course the students will be able to

CO1- To get full concept of groups.

CO2- To deal with module and also get knowledge about simple modules, free Modules, quotient modules.

CO3- To understand linear transformation, reduction to triangular form, Nilpotent transformation etc.

CO4- To solve many problems related to linear transformation by primary decomposition theorem, Jordan block and Jordan form.

CO5- To get knowledge about smith normal form.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5		✓	✓	✓	
PO_6					
PO_7					
PO_8	✓	✓	✓	✓	✓
PO_9	✓	✓	✓	✓	✓
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓	✓	✓	✓

M.Sc. I Sem.

Paper II– Real Analysis I

Course Outcome

After Completing the course the students will be able to

CO1- To learn the role of real analysis in mathematics.

CO2- To demonstrate the ability to use & operate sequence and series of function.

CO3- To demonstrate the ability to manipulate use power series.

CO4- To get knowledge about function of several variables, Taylor theorem, Inverse function theorem, Implicit function theorem.

CO5- To gain skill by using Jacobians.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓		✓	✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓	✓	✓	✓

M.Sc. I Sem.

Paper III –Topology–I

Course Outcome

After Completing the course the students will be able to

CO1-To get knowledge about countable & uncountable set and uses of Schroeder Bernstein theorem.

CO2-Undrestand to construct topological space from metric space and using general properties of neighbourhood,open set, closed set, base, subbase etc.

CO3- Apply the property of open set, closed set, interior point, accumulation points and derived sets in deriving the proofs of various theorem.

CO4- Understand the concept of separable axioms, compact space.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓		✓
PO_3	✓	✓	✓	✓
PO_4	✓	✓	✓	✓
PO_5	✓	✓	✓	✓
PO_6				
PO_7				✓
PO_8	✓	✓	✓	
PO_9	✓	✓	✓	
PO_{10}	✓	✓	✓	
PO_{11}	✓	✓	✓	✓

M.Sc. I Sem.

Paper V- Advanced Discrete Mathematics (I)

Course Outcome

The students will be able

CO1- To determine equivalent logic expression.

CO2- To understand the concept of Homomorphism ,congruence relation.

CO3- To demonstrate the ability to use lattices, Boolean algebra.

CO4- to demonstrate the ability to solve the problem using AND,OR.NOT gates

CO5- To demonstrate the ability to know grammer and language.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	
PO_6	✓	✓	✓	✓	✓
PO_7		✓			✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓	✓	✓	✓
PO_{11}	✓	✓		✓	✓

M.Sc. I Sem.

Paper V- DIFFERENTIAL GEOMETRY

Course Outcome

The students will be able

CO1-To develop understanding of basics of differential geometry.

CO2- To understand and solve problems related to surface of revolution.

CO3-To get knowledge about geodesics.

CO4- To demonstrate the ability to solve problem related to non-intrinsic properties of surface.

CO5- To get knowledge about fundamental equation of surface theory, Hilbert lemma.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓			✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓	✓		

M.Sc. I Sem.

Paper V- MATHEMATICAL PROGRAMMING

Course Outcome

The students will be able

CO1- To analyze and solve mathematical programming models of real life situations.

CO2- To solve optimization problem graphically, algebraically.

CO3- To learn the concept of Simplex method and revised Simplex method.

CO4- To analyze the concept of Goal Programming.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓	✓	
PO_3	✓	✓	✓	✓
PO_4	✓	✓	✓	✓
PO_5	✓			✓
PO_6	✓	✓	✓	✓
PO_7			✓	
PO_8	✓	✓	✓	
PO_9		✓	✓	
PO_{10}	✓	✓		✓
PO_{11}	✓	✓		

M.Sc. I Sem.

Paper V- Complex Analysis-I

Course Outcome

The students will be able

CO1- To learn the role of Cauchy- Goursat theorem and Cauchy integral formula in calculation of contour integration.

CO2- To learn Taylor & Laurent series for expansion of analytic function.

CO3- To understand the concept of Bilinear transformation.

CO4- To know the concept of Hurwitz theorem, Montel theorem

CO5- To understand the concept of Gamma function,Zeta function.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓			

M.Sc. II Sem.

Course Code	Course Type	Course (Paper/Subjects)
MSM 201	**CCC**	**Advanced Abstract Algebra (II)**
MSM 202	**CCC**	**Real Analysis(II}**
MSM 203	**CCC**	**Topology(II)**
MSM S02	**OSC**	**Research Methodology & Computer Application**
MSM B01	ECC/CB	Environmental & Forest Laws
MSM B02	ECC/CB	Advanced Discrete Mathematics (II)
MSM B03	ECC/CB	Algebraic Number Theory
MSM B04	**ECC/CB**	**Complex Analysis (II)**

M.Sc. II Sem.
Paper I
ADV. ABSTRACT ALGEBRA II

Course Outcome

The students will be able

CO1- To explain the fundamental concepts of adfvanced algebra such as groups and rings and their role in modern mathematics and applied context.

CO2- To demonstrate accurate and efficient use of algebraic techniques.

CO3- To demonstrate capacity for mathematical reasoning through analyzing ,proving and explaining concepts from advanced algebra.

CO4- To apply problem solving using advanced algebraic techniques applied to diverse situation in physics,engineering and other mathematical contexts.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓	✓	✓
PO_3	✓	✓	✓	✓
PO_4	✓	✓	✓	✓
PO_5		✓		✓
PO_6				
PO_7				
PO_8	✓	✓	✓	✓
PO_9			✓	
PO_{10}	✓	✓	✓	✓
PO_{11}	✓	✓	✓	

M.Sc. II Sem.
Paper II- Real Analysis II
Course Outcome

The students will be able

CO1- To understand how Lebesgue measure on R is defined.

CO2- To understand the basic properties of measurable function.

CO3- To understand how measure may be used to construct integrals.

CO4- To know the basic convergence theorem for the Lebesgue integral.

CO5- To understand the relation between Lebesgue differentiation and Lebesgue integration.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓
PO_6					
PO_7					✓
PO_8	✓	✓	✓		✓
PO_9			✓	✓	✓
PO_{10}	✓	✓	✓	✓	✓
PO_{11}					

M.Sc. II Sem.
Paper III- Topology II
Course Outcome

The students will be able

CO1-To know the definition and basic properties of connected spaces,product spaces.

CO2- To gain knowledge about Tychonoffs product topology.

CO3- To familiar with the embedding and metrization theorems.

CO4- To understand the concept of Net and Filter.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4
PO_1	✓	✓	✓	✓
PO_2	✓	✓	✓	
PO_3	✓	✓	✓	✓
PO_4	✓	✓	✓	✓
PO_5	✓	✓	✓	✓
PO_6				
PO_7				
PO_8	✓	✓	✓	
PO_9			✓	
PO_{10}	✓	✓	✓	✓
PO_{11}				

M.Sc II Semester
Paper V- Advanced Discrete Mathematics II
Course Outcome

The students will be able

CO1- To demonstrate different traversal mathods for trees and graphs.

CO2- To solve model questions in computer science using trees and graphs.

CO3- To gain knowledge about Finite state machine.

CO4- To formulate and solve problems from diverse areas using application specific analysis and /or graph model.

CO5- To demonstrate the ability to write and evaluate a proof.

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PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5		✓	✓		
PO_6	✓	✓	✓	✓	✓
PO_7	✓				✓
PO_8	✓	✓	✓	✓	✓
PO_9			✓		✓
PO_{10}	✓	✓		✓	
PO_{11}		✓	✓	✓	✓

M.Sc. II Semester
Paper V- Algebraic Number theory
Course Outcome

The students will be able

CO1-To learn about the arithmetic of algebraic number fields.

CO2- To prove theorems about integral bases and about unique factorisation into ring and fields .

CO3-To understand the concept of algebraic numbers and algebraic integers.

CO4- To understand how to factorise an algebraic integer into irreducible.

CO5- To understand how to find the ideals of an algebraic number ring.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓				
PO_6			✓		
PO_7		✓	✓	✓	✓
PO_8	✓	✓	✓	✓	✓
PO_9		✓	✓	✓	✓
PO_{10}	✓	✓		✓	
PO_{11}		✓		✓	✓

M.Sc. II Semester
Complex Analysis –II
Course Outcome

The students will be able

CO1-To compute definite integrals using residue theorem.

CO2-To understand the concept of Analytic continuation and properties of solutions to complex differential equation.

CO3- To understand the concept of Entire function.

CO4- To know the concept of Hadmard three circle theorem, Hadmard factorization theorem.

CO5- To apply the problem –solving using complex analysis techniques applied to diverse situations in physics, engineering.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5					
PO_6					
PO_7					✓
PO_8	✓	✓	✓	✓	✓
PO_9			✓		✓
PO_{10}	✓	✓		✓	
PO_{11}					

M.Sc. III Sem.

Course Code	Course Type	Course (Paper/Subjects)
MSM 301	**CCC**	**Integration Theory and Functional Analysis (I)**
MSM 302	**CCC**	**Partial Differential Equations & Mechanics (I)**
MSM 303	**CCC**	**Operations Research (I)**
MSM S03	**OSC**	**Intellectual Property Law**
MSM C 01	ECC/CB	Tribal Studies
MSM C 02	ECC/CB	Mathematical Modelling
MSM C 03	ECC/CB	Fluid Dynamics
MSM C 04	**ECC/CB**	**Numerical Analysis I**

M.Sc.III Sem.(Maths)
Integration Theory and Functional Analysis I
Course Outcome

The students will be able

CO1- To acquire basic knowledge of measure and integration theory.

CO2- To analyze measurable set and Lebesgue measure.

CO3- To analyze Lebesgue –Stieltzes integral and Fubini's theorem.

CO4- To understand the knowledge of normed linear space in functional analysis.

CO5- To understand the concept of weak convergence and bounded linear transformation.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓			
PO_7					
PO_8					
PO_9	✓	✓	✓	✓	✓
PO_{10}	✓	✓		✓	
PO_{11}					

M.Sc.III Sem.(Maths)

Partial Differential Equations and Mechanics (I)

Course Outcome

The students will be able

CO1- To understand the basic properties of standard PDE's.

CO2- To solve some problems of Green function and Harmonic function.

CO3- To find the solution of Laplace and Poisson equation.

CO4- To analyze the fundamental solution and properties of Heat equation and Wave

equation.

CO5-To demonstrate accurate and efficient use of Fourier, Laplace and

Legendre transform and their application in the theory of PDE's.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓	✓		
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}					

M.Sc.III Sem.(Maths)

Operation Research I

Course Outcome

The students will be able

CO1- To understand the application of OR and frame a LP Problem with solution.

CO2- To formulate some real life problem into linear programming problem.

CO3- To use simplex method to find an optimal solution.

CO4- To find optimal solution of transportation problem and assignment problem.

CO5- To formulate and solve parametric, goal programming.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	
PO_6	✓	✓			
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓		
PO_{10}	✓	✓		✓	
PO_{11}	✓	✓	✓	✓	✓

M.Sc.III Sem.(Maths)

Mathematical Modelling

Course Outcome

The students will be able

CO1- To understand what a mathematical model is and explain the series of steps involved in a mathematical modelling process.

CO2**-** To state and explain the different classifications of mathematical models stating examples in each classes.

CO3- To explain the essential features of a good model and discuss the benefits of using mathematical modelling.

CO4 -To identify some simple real life problems that can be soved using mathematical models,model the problems ,solve the resulting problem and interpret the solution.

CO5- To acquire basic mathematical modelling skills that will enable them carry out simple modelling tasks individually or as a group.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5				✓	✓
PO_6	✓	✓		✓	✓
PO_7	✓	✓	✓		
PO_8	✓	✓	✓	✓	✓
PO_9					
PO_{10}	✓	✓	✓	✓	✓
PO_{11}					

M.Sc.III Sem.(Maths)

FLUID DYNAMICS

Course Outcome

The students will be able

CO1-To understand the basic principles of fluid mechanics such as Lagrangian & Eulerian approach etc.

CO2- To use Euler's and Bernoulli's equation and conservation of mass to determine pressure for incompressible and inviscid fluid.

CO3- To understand the concept of three dimensional flow, sources, sinks and doublets etc.

CO4- To understand the concept of rotational & irrotational flow, stream function, complex velocity etc.

CO5- To analyse simple fluid flow problem & understand the concept of stress, stain.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓
PO_6	✓	✓		✓	✓
PO_7					
PO_8	✓	✓	✓	✓	✓
PO_9					
PO_{10}	✓	✓	✓	✓	✓
PO_{11}					

M.Sc.III Sem.(Maths)

Numerical Analysis –I

Course Outcome

The students will be able

CO1-To apply calculus of finite differences.

CO2-To apply various interpolation formulas for equal interval in calculus of finite differences.

CO3-To apply various interpolation formulas for unequal interval in calculus of finite differences.

CO4-To understand central difference interpolation formulas & used in different area.

CO5- To work out numerical differentiation, integration whenever and wherever routine methods are not applicable.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5					
PO_6	✓	✓		✓	
PO_7					
PO_8	✓	✓	✓		✓
PO_9			✓		✓
PO_{10}	✓	✓		✓	
PO_{11}		✓		✓	✓

M.Sc. IV Sem.

Course Code	Course Type	Course (Paper/Subjects)
MSM 401	**CCC**	**Integration Theory and Functional Analysis (II)**
MSM 402	**CCC**	**Partial Differential Equations & Mechanics (II)**
MSM 403	**CCC**	**Operations Research (II)**
MSM 421	**SSC/PRJ**	**Dissertation**
MSM D 01	ECC/CB	Fuzzy Sets and their applications
MSM D 02	ECC/CB	Mathematical Economics
MSM D 03	ECC/CB	Mathematical Statistics
MSM D 04	ECC/CB	Number Theory and Cryptography
MSM D 05	**ECC/CB**	**Numerical Analysis II**

M.Sc.IV Sem.(Maths)

Integration Theory And Functional Analysis II

Course Outcome

The students will be able

CO1- To acquire basic knowledge of normed linear space and inner product space.

CO2- To analyze the concept of different theorem like Hahn Banach theorem, closed graph theorem, open mapping theorem etc.

CO3- To understand the concept of compact ,self –adjoint and normal operators.

CO4- To understand the concept of the spectrum of bounded linear operator.

CO5- To understand the difference between Banach space and Hilbert space.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓
PO_6	✓	✓		✓	✓
PO_7					
PO_8	✓	✓	✓	✓	✓
PO_9					
PO_{10}	✓	✓	✓	✓	✓
PO_{11}					

M.Sc.IV Sem.(Maths)

Partial Differential Equations And Mechanics (II)

Course Outcome

The students will be able

CO1- To recognize and use basic concepts and principles of classical mechanics and apply them to simple examples

CO2- To define and understand basic mechanical concepts related to advanced problems involving the dynamic motion of classical mechanical system.

CO3- To able to describe and understand the motion of a mechanical system using Lagrange's, Hamilton's equations.

CO4- To formulate physical problems as PDE's using conservation laws.

CO5- To solve complicated physical problems using the principle of least action.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5					
PO_6	✓	✓		✓	✓
PO_7					
PO_8	✓	✓	✓	✓	✓
PO_9	✓	✓	✓	✓	✓
PO_{10}	✓	✓	✓	✓	✓
PO_{11}					

M.Sc.IV Sem.(Maths)
Operation Research (II)
Course Outcome

The students will be able

CO1- To formulate & solve problems as networks and graph.

. CO2- To develope linear programming models for shortest path, maximum flow,minimal spanning tree, critical path etc.

CO3- To learn the construction of networks of a project and optimal scheduling using CPM and PERT.

CO4-To formulate and solution of linear programming model of two person zero sum games..

CO5- To solve non –linear programming problems using Lagranges multiplier & Kuhn –Tucker condition.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4					
PO_5	✓	✓	✓	✓	✓
PO_6	✓	✓		✓	✓
PO_7					✓
PO_8	✓	✓	✓		
PO_9			✓	✓	
PO_{10}	✓	✓	✓	✓	✓
PO_{11}					

M.Sc.IV Sem.(Maths)

FUZZY SETS AND ITS APPLICATIONS

Course Outcome

The students will be able

CO1-To distinguish between the crisp set and fuzzy set concept through the learned differences between the crisp set characteristic and the fuzzy set membership function.

. CO2- To understand the extension principles.

CO3- To demonstrate fuzzy relation on fuzzy set .

CO4- To understand the concept of fuzzy logic.

CO5- To analyze possibility theory, evidence theory.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓
PO_6	✓	✓		✓	✓
PO_7			✓	✓	✓
PO_8	✓	✓	✓		
PO_9	✓	✓	✓		✓
PO_{10}	✓	✓		✓	✓
PO_{11}	✓		✓	✓	

M.Sc.IV Sem.(Maths)

Mathematical Economics

Course Outcome

The students will be able

CO1- To improve the mathematical skills necessary to study economics.

. CO2- To use appropriate techniques to solve problems with calculus and linear algebra.

CO3- To use mathematics in economics and business applications successfully.

CO4- To develop analytical and organization skills.

CO5- To develop both independent learning and group work skills.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓				✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓		✓	✓	
PO_6	✓	✓			
PO_7	✓		✓	✓	✓
PO_8	✓	✓	✓		
PO_9	✓	✓	✓		✓
PO_{10}	✓	✓		✓	✓
PO_{11}	✓		✓	✓	

M.Sc.IV Sem.(Maths)

Mathematical Statistics

Course Outcome

The students will be able

CO1- To describe and discuss the key terminology, concepts tools and techniques used in business statistical analysis.

. CO2- To critically evaluate the underlying assumptions of analysis tools.

CO3- To understand and critically discuss the issues surrounding sampling and significance.

CO4- To discuss critically the uses and limitations of statistical analysis.

CO5- To solve a range of problems using the techniques covered and conduct basic statistical analysis of data.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓		✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓	✓	✓	✓	✓
PO_6	✓	✓			
PO_7		✓	✓	✓	✓
PO_8	✓	✓	✓	✓	
PO_9		✓	✓		✓
PO_{10}	✓	✓		✓	✓
PO_{11}	✓		✓	✓	

M.Sc.IV Sem.(Maths)

NUMBER THEORY AND CRYPTOGRAPHY

Course Outcome

The students will be able

CO1- To study briefly about number theory ,encryption and secrecy.

. CO2- To learn about symmetric key encryption ,stream cipers and DES

CO3- To gain knowledge about factorization problem and discrete logarithm problem.

CO4- To understand finite fields and quadratic residues with basic properties.

CO5- To study briefly about public key cryptography,RSA and discrete logarithm.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓		✓	✓	
PO_6	✓	✓	✓		
PO_7	✓	✓	✓	✓	✓
PO_8	✓	✓	✓		
PO_9			✓		✓
PO_{10}	✓	✓	✓	✓	✓
PO_{11}	✓		✓	✓	

M.Sc.IV Sem.(Maths)
Numerical Analysis -II
Course Outcome

The students will be able

CO1- To perform basic mathematical operations on numerical analysis.

. CO2- To investigate numerical solution of difference equation.

CO3- To gain knowledge in finding solution of ordinary differential equation problem.

CO4- To find a numerical solution of differential equation by different method like Euler method, Picard method ,Taylor method etc.

CO5- To research numerical solutions of difference and differencial equation systems.

PO-CO Mapping

	CO_1	CO_2	CO_3	CO_4	CO_5
PO_1	✓	✓	✓	✓	✓
PO_2	✓	✓	✓	✓	✓
PO_3	✓	✓	✓	✓	✓
PO_4	✓	✓	✓	✓	✓
PO_5	✓		✓	✓	
PO_6	✓	✓			
PO_7			✓	✓	✓
PO_8	✓	✓	✓		
PO_9			✓		✓
PO_{10}	✓	✓		✓	✓
PO_{11}	✓		✓	✓	

Deptt. of Mathematics

Local, Regional, National & Global Relavance

S.N.	Class
1.	B.Sc.(NEP)-DSC
2.	B.Sc.(NEP)-DSE
3.	B.Sc.(NEP)-SEC
4.	B.Sc.(Old Course)
5.	M.Sc.(All Semester)

B.Sc. Semester System (NEP)
DSC-Maths

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
DSCMAT 01	**Calculus**	• Concept of Limit, Continuity, differentiability • Successive differentiation, Some important theorem of Calculus • Asymptotes, Curvature, Tracing of curves • Line, Surface and Volume integration & Related theorems			✓	✓
DSCMAT 02	**Algebra**	• Polynomial Ring • Groups, subgroups, Normal Subgroups • Homomorphism, Cyclic and Permutation Groups • Ring, Field and integral domain, Ideals			✓	✓
DSCMAT 03	**Calculus and Algebra**	• Partial Differentiation • Groups, subgroups, Normal Subgroups • Homomorphism, Cyclic and Permutation Groups • Ring, Field and integral domain, Ideals			✓	✓
DSCMAT 04	**Real Analysis**	• Real Numbers • Convergence of sequences in R • Infinite Series • Riemann integral			✓	✓
DSCMAT 05	**Linear Algebra**	• Row Echelon form of Matrices and Applications • Vector Spaces • Linear transformation • Inner Product Spaces			✓	✓
DSCMAT 06	**Metric Space**	• Introductory Concept • Cantor intersection theorem • Compactness • Seperated Sets			✓	✓

B.Sc. Semester System (NEP)
DSE-Maths

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
DSEMAT 01	**Discrete Mathematics**	• Sets and Prepositions • Relations and Functions • Recurrence relation & Recurrence Algorithm • Boolean Algebra			✓	✓
DSEMAT 02	**Mechanics**	• Analytic condition of equilibrium, Catenary • Forces in three dimensions • Simple harmonic function, Elastic string, Velocity & acceleration about radial and transverse direction • Motion in resisting medium, Motion of particles, Central orbits	✓	✓	✓	✓
DSEMAT 03	**Numerical Methods**	• Algebraic & Transcendental equations • Solution of Linear Systems • Interpolation • Numerical differentiation & Iintegration		✓	✓	✓
DSEMAT 04	**Probability & Statistics**	• Probability &Random Variables • Univariate distributions • Bivariate distributions • Correlation & Regression	✓	✓	✓	✓

B.Sc. Semester System (NEP)
SEC(Maths)

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
SECMAT 01	**Quantitative Aptitude**	• Alphabet, Coding & decoding, Direction, Ranking • Calendar, Time & clock, Arithmetical reasoning, blood relation	✓	✓	✓	✓
DSEMAT 02	**Mathematical & Logical Reasoning**	• Number 7simplication,HCF & LCM, Average, Quadratic Equation • Percentage, Profit 7 Loss, simple interest, Compound interest, Ratio & Proportion	✓	✓	✓	✓

B.Sc. Semester System (Old Course)

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
UD5-101	**Calculus & Algebra I**	• Concept of Limit, Continuity, differentiability Successive differentiation, Some important theorem of Calculus • Asymptotes, Curvature, Tracing of curves • De-Movier's theorem & its application • Relation between the roots and coefficients • Vector differentiation & Integration		✓	✓	✓
UD5-102	**Calculus & Algebra II**	• Quadrature,rectification, volume & surface of solids of revolution • Diff. equation of first order & first degree • Linear diff. equations of second order • Mapping, Groups, subgroups, • Normal subgroup, ring, Integral domain,field			✓	✓
UD5-201	**Advanced Calculus & Diff. Equations -I**	• Sequence & series of real numbers • Mean value theorems & geometrical interpretations ,Taylor's theorem • Partial derivatives, Euler's theorem on homogenous functions • Series solution of diff. equations, Legendre function, Bessel function • Laplace transformation			✓	✓
UD5-202	**Advanced Calculus & Diff. Equations -II**	• Envelops, Evolutes, Maxima & Minima • Beta & Gamma function, Double & triple integration • Partial diff. equation of first order & first degree • Partial diff. equation of second & higher order			✓	✓

		• Calculus of variations				
UD5-301	**Analysis & Abstract Algebra -I**	• Series of arbitrary terms, Double series, Fourier series • Riemann integral • Complex number, Analytic function, Elementary function, Mobius transformation • Vector Spaces • Linear transformation			✓	✓
UD5-302	**Analysis & Abstract Algebra -II**	• Metric Space • Seperable space, Compactness,Connectedness • Group automorphism & its theorems • Ring theory • Inner product space			✓	✓

Deptt. of Maths
Local, Regional, National &Global Relavance

M.Sc. Semester -I

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
MSM101	**Advanced Abstract Algebra –I**	• Groups-Normal series, Composition series • Modules • Linear Transformations • Canonical Forms • Smith normal form over a principal ideal			✓	✓
MSM102	**Real Analysis -I**	• Riemann-Stieltjes integral • Sequences and series of a function • Power series • Function of several variables • Jacobians, Stoke's theorem			✓	✓
MSM103	**Topology–I**	• Countable & uncountable sets • Topological Spaces • Properties of Topological space • Seperation axioms • Compactness			✓	✓
MSMA-05	**Complex Analysis-I**	• Complex integration • Principle of argument • Bilinear transformation • Spaces of analytic function • Entire function		✓	✓	✓

M.Sc. Semester –II

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
MSM201	**Advanced Abstract Algebra –II**	• Noetherian & Artinian Module • Field theory • Normal extensions • Galios Field and extensions • Generalised Jordan form			✓	✓
MSM202	**Real Analysis -II**	• Lebesgue Outer Measure • Non-measurable sets • Outer measures • The Four derivatives • The L^p space			✓	✓
MSM203	**Topology–II**	• Connected Space • Product Space • Embedding & Metrization • Nets & Filter • The fundamental group			✓	✓
MSMB-05	**Complex Analysis-II**	• Monomorphic function • Analytic continuation • Harmonic function • Order of an entire function • The range of an analytic function			✓	✓

M.Sc. Semester –III

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
MSM301	**Integration Theory and Functional Analysis I**	• Measure Theory • Lebesgue –Stieltzes integral • Baire sets • Normed Linear spaces • Weak Convergence		✓	✓	✓
MSM302	**Partial Diff. Equations & Mechanics I**	• Laplace's Equation • Heat Equation,Wave equation • Non-linear first order PDE • Laplace & Fourier Transform • Gravitation		✓	✓	✓
MSM303	**Operation Research I**	• Convex sets, Graphical method for solving LPP • Solution of LPP- Simplex method, Two phase method, Big-M method • Duality in Linear programming • Parametric Linear Programming • Transportation and Assignment Problem	✓	✓	✓	✓
MSMC-04	**Numerical Analysis –I**	• The calculus of finite differences • Interpolation with Equal Intervals • Interpolation with Unequal Intervals • Central difference Interpolation • Numerical differentiation & integration		✓	✓	✓

M.Sc. Semester -IV

Course Code	Paper	Description	Relavance			
			Local	Regional	National	Global
MSM401	Integration Theory and Functional Analysis II	• Uniform boundedness theorem • Some important theorem of normed linear space • Inner product space • Hilbert space • Operators			✓	✓
MSM402	Partial Diff. Equations & Mechanics II	• Lagrange's equation • Hamilton equation • Calculus of variation • Brackets • Hamilton- Jacobi equation			✓	✓
MSM403	Operation Research II	• Network Analysis • Dynamic Programming • Gme theory • Integer Programming • Non- linear programming	✓	✓	✓	✓
MSMD-05	Numerical Analysis –II	• Difference equation I • Difference equation II • Numerical Solution of ordinary diff. equation of first order • Solution of algebraic & transcendental equation • Simultaneous linear algebraic equation		✓	✓	✓