DEPARTMENT OF MATHEMATICS Departmental Profile

About the Department:

The Under Graduate Department of Mathematics was established in the college in 2016. The aim of the Mathematics Department is to give the learners a sound understanding of Mathematics subject. In the Department of Mathematics, the highest priority is given to develop an understanding of Mathematics and other literature of their choice in the proper historical perspective.

Vision and Mission of the Department:

Vision: To create an enlighten society of educated young minds with scientific temperament, logical analysis and rational thinking.

Mission: As we know that every problem has a solution as long as you apply the right formula. Our mission is to prepare the students not only for the three year academic phase but also for the period where they have to struggle individually for their careers and jobs. Our teaching is career based with maximum focus on analytical and practical abilities.

- **1. Year of establishment:** 2016
- 2. Number of post sanctioned: 0
- 3. Number of post filled: 01
- 4. Total Number of Text books reference books and other kind of books: 219
- 5. Teaching methods adopted to improve student learning: Quiz competition, group discussions.
- 6. Teaching Experience:
 - Working as Lecturer in Mathematics in Govt. Higher Secondary School Samote.
 - Worked as Lecturer in Mathematics at Govt. College for Women Parade.
 - Worked as Assistant Professor of Mathematics at Govt. Degree College Sunderbani.
- 7. Faculty profile with name, qualification, designation, specialization, (D.Sc./D.Litt./Ph.D./ M.Phil.etc.):

	Harshal Shar Assistant Professor of 1 Qualification: M.S	ma Mathematics Sc. NET	sharmaharshal	505@gmail.com
Name	Designation	Qualification	Specialization	No. of years of
				Experience
Harshal Sharma	Assistant Professor	M.Sc., NET	Real Analysis	2 years

Programmes offered: B.A , B.Sc.:

Code	SUBJECT COMBINATION				
S1	Physics	Chemistry	Mathematics	EVS	Comm.English/Hindi/
					Urdu/ Punjabi
S2	Physics	Computer	Mathematics	EVS	Comm.English/Hindi/
		Application			Urdu/ Punjabi
S3	Physics	Geography	Mathematics	EVS	Comm.English/Hindi/
					Urdu/ Punjabi
S4	Chemistry	Geography	Mathematics	EVS	Comm.English/Hindi/
					Urdu/ Punjabi
A1	English/Hindi/Urdu/Punjabi	Computer	Mathematics	EVS	Comm.English/Hindi/
		Application			Urdu/ Punjabi
A5	English/Hindi/Urdu/Punjabi	Economics	Mathematics	EVS	Comm.English/Hindi/
					Urdu/ Punjabi

SYLLABUS OF MATHEMATICS:

The Department of Mathematics offered the following courses for boys and girls in different semesters.

Sem 1st (Core): Differential Calculus

Sem 2nd (Core): Differential Equations

Sem 3rd (Core): Real Analysis

Sem 4th (Core): Algebra

Sem 5th (Core): Linear Algebra

Sem 6th (Core): Complex Analysis

EXAMINATION:

Semester	Title	Internal Exam	External Exam	Total
Sem 1 st (Core)	Differential Calculus	20	80	100
Sem 2 nd (Core)	Differential Equations	20	80	100
Sem 3 rd (Core)	Real Analysis	20	80	100
Sem 4 th (Core)	Algebra	20	80	100
Sem 5 th (Core)	Linear Algebra	20	80	100
Sem 6 th (Core)	Complex Analysis	20	80	100

Program Specific Outcomes and Course Outcomes

Programme Outcomes:

Students who choose B.A/B.Sc with Mathematics as one subject develop the ability to think critically, logically and analytically and hence use mathematical reasoning in everyday life. Pursuing a degree in mathematics will introduce the students to a number of interesting and useful ideas in preparations for a number of mathematics careers in education, research, government sector, business sector and industry. The programme covers the full range of mathematics, from classical Calculus to Number Theory and Modern Algebra. The course lays a structured Foundation of Calculus, Real analysis & Complex analysis, Abstract Algebra, Differential equations, Partial differential Equations , Linear Algebra and. An exceptionally broad range of topics covering Pure & Applied Mathematics cater to varied interests and ambitions of the students. Skill enhancement Courses enable the student acquire the skill relevant to the main subject. Choices from Discipline Specific Electives provides the student with liberty of exploring his interests within the main subject. The well-structured programme empowers the student with the skills and knowledge leading to enhanced career opportunities in industry, commerce, education, finance and research. Further the programme

- Inculcate critical thinking to carry out scientific investigation objectively without being biased with preconceived notions.
- Equip the student with skills to analyze problems, formulate hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.
- Prepare students for pursuing research or careers in mathematical sciences and allied fields Imbibe effective scientific and/or technical communication in both oral and writing. Continue to acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical sciences.

Programme Specific Outcomes

- Understanding of the fundamental axioms in mathematics and capability of developing ideas based on them.
- Inculcate mathematical reasoning.
- Prepare and motivate students for research studies in mathematics and related fields.
- Provide knowledge of a wide range of mathematical techniques and application of mathematical methods/tools in other scientific and engineering domains.
- Provide advanced knowledge on topics in pure mathematics, empowering the students to pursue higher degrees at reputed academic institutions.
- Strong foundation on Abstract Algebra, Real Analysis and complex Analysis.
- Good understanding of number theory which can be used in modern online cryptographic technologies.
- Nurture problem solving skills, thinking, creativity through assignments, project work.
- Assist students in preparing (personal guidance, books) for competitive exams e.g. NET, NBHM, SET, GATE, etc.

Course Outcomes:

Semester I	Course : Differential Calculus (UMTTC-101)				
	Course Objectives: The primary objective of this course is to introduce the basic tools of calculus and to understand the extension of the studies of				
	single variable differential calculus to functions of two or more independent				
	variables Course Learning Outcomes: This course will enable the students to:				
	i) Understand concepts of limit and continuity on R through ϵ - δ definition.				
	ii) Learn the conceptual variations when advancing in calculus from one variable to multivariable discussions.				
	iii) Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference.				
	iv) Learn the applications of mean value theorem and Taylor's				
	theorem.				
Semester II	Course : Differential Equations (UMTTC-202)				
	Course Objectives: The main objectives of this course are to introduce the				
	students to the exciting world of Differential Equations (Ordinary				
	Differential equations and Partial Differential equations) and their				
	applications.				
	Course Learning Outcomes: The course will enable the students to:				
	i) Understand basic concepts of Differential Equations				
	ii) Solve first order linear and non-linear differential equation and linear				
	differential equations of higher order using various techniques.				
	iii) Formulate, classify and solve linear and non-linear partial differential equations using various methods; and apply these methods in solving				
	some physical problems.				

Semester III	Course : Real Analysis (UMTTC-301)				
	Course	Objectives: The course will develop a deep and rigorous			
	understanding of Real line and Real valued functions and of defining terms				
	to prove the results about convergence and divergence of sequences and				
	series of	f real numbers and real valued functions. These concepts has wide			
	range of	applications in real life scenario.			
	Course	Learning Outcomes: This course will enable the students to:			
	i)	Understand many properties of the real line and learn to define			
		sequence in terms of functions from a subset of Natural no's to			
	Real line.				
	ii)	Recognize bounded, convergent, divergent, Cauchy and			
		monotonic sequences and to calculate their limit superior, limit			
		inferior, and the limit of a bounded sequence.			
	iii)	Apply the ratio, root, alternating series and limit comparison tests			
		for convergence and absolute convergence of an infinite series of			
		real numbers.			
	iv)	The geometrical properties of continuous functions on closed and			
		bounded intervals.			
	v)	Sequence and series of Real valued functions along with power			
		series and radius of convergence.			
Semester IV	Course : Algebra (UMTTC-401)				
	Course Objectives: The objective of the course is to introduce the				
	fundamental theory of groups and their homomorphisms. Symmetric groups and group of symmetries are also studied in detail. Fermat's Little theorem and Euler's theorem as a consequence of the Lagrange's theorem on finite				
	groups.	Concept of Ring and Field and their homomorphism.			
	Course Learning Outcomes: The course will enable the students to:				
	i)	Recognize the mathematical objects that are groups, and classify			
		them as abelian, cyclic and permutation groups, etc;			
	ii)	Link the fundamental concepts of Groups and symmetrical figures;			
	iii)	Explain the significance of the notion of cosets, normal subgroups,			
		and factor groups.			
	iv)	Learn the fundamental concept of Rings, Fields, subrings, integral			
		domains and the corresponding homomorphisms.			

Semester V	Course : Matrices (UMTTE-501)				
	Course Objectives: The primary objective of this course is to introduce the				
	basic tools of theory of equations and matrices to understand their linkage				
	to the real-world problems. Perform matrix algebra with applications.				
	Course Learning Outcomes: This course will enable the students to:				
	i) Understand different types of Matrices and their types.				
	ii) Find Rank and also find eigenvalues and corresponding				
	eigenvectors for a square matrix.				
	iii) Recognize consistent and inconsistent systems of linear equations				
	by the row echelon form of the augmented matrix, using rank.				
	iv) Find matrix form of basic geometric transformations and				
	interpretation of eigenvalues and eigenvectors of such				
	transformations.				
	v) Diagonalize square matrices and learn its applications.				
	<u>Course : Linear Algebra (UMTTE-503)</u>				
	Course Objectives: The objective of this course is to introduce the				
	fundamental theory of vector spaces, and Linear Transformations.				
	Course Learning Outcomes: The course will enable the students to learn				
	about:				
	i) The fundamental concept of vector spaces with plenty of examples				
	from different mathematical areas and the corresponding vector				
	subspaces.				
	ii) The concept of linear independence of vectors over a field, the idea				
	of a finite dimensional vector space, basis of a vector space and the				
	dimension of a vector space.				
	iii) Basic concepts of linear transformations, the Rank-Nullity Theorem,				
	matrix of a linear transformation, algebra of transformations and the				
	change of basis and Dual space and dual basis of vector space.				

Semester VI	Course : Numerical Methods (UMTTE-601)			
	Course Objectives: To comprehend various computational techniques to			
	find approximate value for possible root(s) of non-algebraic equations, to			
	find the approximate solutions of system of linear equations and ordinary			
	differential equations. Also, the use of Computer Algebra System (CAS) by			
	which the numerical problems can be solved both numerically and			
	analytically, and to enhance the problem solving skills.			
	Course Learning Outcomes: The course will enable the students to learn			
	the following:			
	i) Some numerical methods to find the zeroes of nonlinear functions of			
	a single variable and solution of a system of linear equations, up to a			
	certain given level of precision.			
	ii) Interpolation techniques to compute the values for a tabulated			
	function at points not in the table.			
	iii) Applications of numerical differentiation and integration to convert			
	differential equations into difference equations for numerical			
	solutions.			
	Course : Complex Analysis (UMTTE-602)			
	Course Objectives: This course aims to introduce the basic ideas of analysis			
	for complex functions in complex variables with visualization through			
	relevant practicals. Particular emphasis has been laid on De Movries			
	theorem and its applications, Analytic Functions, Cauchy's theorems, series			
	expansions etc.,			
	Course Learning Outcomes: The completion of the course will enable the			
	students to:			
	i) Employ De Moivre's theorem in a number of applications to solve			
	numerical problems.			
	ii) Understand the significance of differentiability of complex			
	functions leading to the understanding of Cauchy-Riemann			
	equations.			
	iii) Understand analytic functions and to evaluate the contour integrals			
	and understand the role of Cauchy-Goursat theorem and the			
	Cauchy integral formula.			
	iv) Get familiar with liouville's theorem and the Fundamental			
	theorem of Algebra and expand some simple functions as their			
	Taylor and Laurent series.			

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