PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

DEPARTMENT OF MATHEMATICS

B.Sc., (MATHEMATICS), EXTRA-CREDIT COURSES & VALUE ADED COURSES

PSOs	PROGRAMME SPECIFIC OUTCOMES
PSO1	Acquiring a strong foundation in various branches of mathematics to formulate real life problems into mathematical models.
PSO2	Enhancing numerical ability and address problems in interdisciplinary areas which would help in project and field works
PSO3	Applying the mathematical knowledge and skills to face competitive examination with confidence.
PSO4	Pursuing higher studies which in turn will offer them job opportunities in government and public sector undertakings, banks, central government institutes etc.
PSO5	developing entrepreneurial skills, become empowered and self dependent in society.
PSO6	Applying knowledge of principles, concepts and results in specific subject area to analyze their local and global impact
PSO7	Communicating appropriately and effectively, in a scientific context using present technology and new findings.

PROGRAMME OUTCOMES

POs	Description of POs
PO1	Applying the acquired scientific knowledge to face day to day needs
PO2	Creating innovative ideas through laboratory experiments
PO3	Carrying out field works and projects independently and in collaboration with other institutions and industries
PO4	Knowing the basic subject knowledge required for higher studies, professional and applied courses like Management Studies, Law etc

PO5	Challenging competitive examinations that offer rewarding careers in science and education.
PO6	Imparting communicative skills and ethical values
PO7	Equipping students with hands on training through various courses to enhance entrepreneurship skills.

.

B.Sc., MATHEMATICS/ COURSE OUTCOMES	
Description of COs	**Blooms' Taxonomy Level**
MUMC1 **Calculus**	
CO1: Acquiring knowledge in solving the double integrals on both Cartesian and polar co-ordinates.	Knowledge (Level K1)
CO2: Understanding the concepts of Beta and Gamma functions	Comprehension (Level K2)
CO3: Demonstrating the use of leibnitze formula finding the nth differential equations.	Application (Level K3)
CO4: Analyzing the concept of differential equations and use various methods of finding the radius of curvature	Analysis (Level K4)
CO5: Evaluating line and surface integrals	Application (Level K3)
MUMC2 Theory of Equations, Trigonometry and Fourier Series	
CO1: Acquiring knowledge of trigonometric functions, the nature of hyperbolic functions, Fourier Series and Vector point functions.	Knowledge (Level K1)
CO2: Understanding how to find the Fourier co-efficient for Periodic functions	Comprehension (Level K2)
CO3: Applying the concepts of Roots multiplied by a given number Standard forms to increase and decrease the roots of given equation by a given quantity in Reciprocal equations.	Application (Level K3)
CO4: Analyzing different methods like Descartes Method, Cardan's method, Ferrari's method in theory of equations	Analysis (Level K4)
CO5: Categorizing the methods of finding the sum of trigonometric series.	Analysis (Level K4)

MUMA1	Allied Mathematics (B.Sc.,Physics & Chemistry) Theory of Equations Matrices, Finite Differences, Trigonometry and Differential Calculus
CO1: Recalling the fundamentals of algebraic equations, matrices and rules of integration	Knowledge (Level K1)
CO2: Practicing the formation of equations and compute symmetric functions of roots in terms of coefficients	Application (Level K3)
CO3: Learning Beta, Gamma functions and evaluate integrals using them	Comprehension (Level K2)
CO4: Revising the properties of eigen values of the matrices	Evaluation (Level K5)
CO5: Practicing the expansion of Fourier series and utilize the same for higher studies	Application (Level K3)
MUMC3	Analytical Geometry and Vector Calculus
CO1: Explaining the physical meaning and properties of curl and divergence	Comprehension (Level K2)
CO2: Recollecting the properties of circle, sphere and can able to gain a deep knowledge in it.	Knowledge (Level K1)
CO3: Understanding the relation between polar and rectangular Cartesian co-ordinates.	Comprehension (Level K2)
CO4: Applying the concept of skew lines in evaluating the shortest distance between them and apply the concepts of Gradient, Divergence and Curl in solving vector differentiation problems.	Application (Level K3)
CO5: Calculating line, surface, double and triple integrals and use Green's theorem in the plane, Gauss' divergence theorem and Stokes' theorem	Analysis (Level K4)
MUMC4	Sequences and Series
CO1: Explaining the primary concepts of sequences and series of real numbers	Comprehension (Level K2)
CO2: Acquiring the basic knowledge of convergence and divergence	Knowledge (Level K1)
CO3: Understanding the behaviour of monotonic sequences	Comprehension (Level K2)
CO4: Applying the definitions of convergence as they apply to sequences and series	Application (Level K3)
CO5: Analyzing the behaviour of convergence of series by using tests	Analysis (Level K4)
MUMA2	Allied Mathematics (B.Sc., Physics & Chemistry) Integral Calculus, Differential Equations, Laplace Transforms & Vector Analysis.
CO1: Explaining the physical meaning and properties of curl	Comprehension (Level K2)

and divergence	
CO2: Practicing the computation of line integrals, surface integrals	Application (Level K3)
CO3: Using computational tools to solve problems and applications of partial differential equations of first order.	Application (Level K3)
CO4: Finding the complementary function and particular integral of a differential equation by using appropriate methods	Comprehension (Level K2)
CO5: Using Laplace transform and their inverse to solve differential equations	Application (Level K3)
MUMTN2 Theory of Numbers	
CO1: Acquiring the basic knowledge of divisibility, congruence, greatest common divisor, prime and prime-factorization.	Knowledge (Level K1)
CO2: Exploring various techniques to congruences of various types.	Comprehension (Level K2)
CO3: Applying the concept of Euler's function , Fermat's theorem and Wilson's theorem.	Application (Level K3)
CO4: Evaluating the Product of r consecutive integers is divisible by r!	Analysis (Level K4)
CO5: Expressing the concepts and results of divisibility of Integers effectively	Comprehension (Level K2)
MUMC5 Modern Algebra	
CO1: Acquiring the basic knowledge and the structure of Group, Subgroup and Cyclic Groups	Knowledge (Level K1)
CO2: Describing the characteristics of a ring, quotient rings and Ideals	Comprehension (Level K2)
CO3: Applying the concepts of homomorphism and isomorphism for groups and rings	Application (Level K3)
CO4: Analyzing and demonstrate examples of subgroups, normal subgroups and quotient groups	Analysis (Level K4)
CO5: Developing proofs of results on Permutation groups, Cyclic groups, Quotient group, Subgroups, subrings , quotient rings	Synthesis(Level K6)
MUMC6 Statics	
CO1: Calculating the reactions necessary to ensure static equilibrium	Comprehension (Level K2)
CO2: Acquiring the basic knowledge of Laws of friction and deploy them in solving the respective problems.	Knowledge (Level K1)
CO3: Understanding the concepts of forces and moments	Comprehension (Level K2)
CO4: Applying the concepts of forces in finding the resultant of more than one force acting on a surface.	Application (Level K3)

CO5: Analyzing the basics of coplanar forces and equilibrium of three forces acting on a rigid body and can solve the simple problems related to it.	Analysis (Level K4)

MUMA3	Statistics – I
CO1: Understanding that correlation coefficient is independent of the change of origin and scale	Comprehension (Level K2)
CO2: Acquiring the knowledge by using Binomial distribution, Poisson distribution etc..	Knowledge (Level K1)
CO3: Understanding random variables and probability distributions.	Comprehension (Level K2)
CO4: Using the different methods of finding the correlation coefficient.	Application (Level K3)
CO5: Computing expected value and variance of discrete and continuous random variables.	Analysis (Level K4)

MUMN1	Quantitative Aptitude – I
CO1: Learning ratio and proportion and practice duplication and triplication of ratios	Comprehension (Level K2)
CO2: Remembering the meaning of HCF and LCM of numbers.	Knowledge (Level K1)
CO3: Understanding the concepts of odd man out & series.	Comprehension (Level K2)
CO4: Applying the concepts of profit & loss in real life problems	Application (Level K3)
CO5: Analyzing the concepts of ratio & proportion	Analysis (Level K4)

MUMMC3	Mathematics for Competitive Examinations – II
CO1: Reviewing the rules of operations on numbers	Comprehension (Level K2)
CO2: Remembering the meaning of BODMAS rule.	Knowledge (Level K1)
CO3: Understanding the concept of percentage on simple problems	Comprehension (Level K2)
CO4: Applying the concept of time and work on real life problems	Application (Level K3)
CO5: Analyzing the problem on trains with solved examples..	Analysis (Level K4)

MUMC7	Differential Equations and Its Applications
CO1: Learning methods of forming and solving partial differential equations	Comprehension (Level K2)
CO2: Identifying and obtain the solution of Clairaut's equation	Knowledge (Level K1)
CO3: Understanding the basic knowledge of complimentary function , particular integral, Laplace Transform and its inverse and solving method of Partial differential equations	Comprehension (Level K2)

CO4: Applying Laplace Transforms to Solve ordinary differential equations with constant co-efficient and simultaneous linear equations	Application (Level K3)
CO5: Analyzing the application of differential equations in the field of Science	Analysis (Level K4)
MUMC8 Dynamics	
CO1: Understanding the general principles of dynamics	Comprehension (Level K2)
CO2: Remembering the notions which were studied under Simple harmonic motion and seconds pendulum	Knowledge (Level K1)
CO3: Understanding the concept of projectiles and its properties by solving some simple problems related to it	Comprehension (Level K2)
CO4: Applying the newtons law in their real life	Application (Level K3)
CO5: Analyzing the concept of impulse, impulsive forces and the collision of elastic bodies and able to solve the simple problems regarding it.	Analysis (Level K4)
MUMA4 Statistics - II	
CO1: Acquiring knowledge of continuous random variables and testing hypothesis	Knowledge (Level K1)
CO2: Understanding the concepts of t, F, z-distributions and its applications and acquire the knowledge by using Normal distribution.	Comprehension (Level K2)
CO3: Demonstrating the use of chi-square distribution	Application (Level K3)
CO4: Analyzing the concepts of sampling techniques and procedure for testing of hypothesis for large samples	Analysis (Level K4)
CO5: Analyzing the the practical purposes of a large and a small sample	Analysis (Level K4)
MUMSS4 Solar System and Stellar Universe	
CO1: Understanding the concepts of Stellar Universe	Comprehension (Level K2)
CO2: Acquiring the knowledge of Sun and Planets	Knowledge (Level K1)
CO3: Understanding the concept of the Solar System	Comprehension (Level K2)
CO4: Demonstrating the different kinds of Eclipses	Application (Level K3)
CO5: Analyzing the various constellations	Analysis (Level K4)
MUMC9 Real Analysis	
CO1: Understand the concepts of completeness, continuity and discontinuity of metric spaces	Comprehension (Level K2)
CO2: Identifying the relation between completeness and compactness sets in metric space.	Knowledge (Level K1)
CO3: Classifying the countable, uncountable, open, closed and compact sets.	Comprehension (Level K2)
CO4: Applying the properties of real numbers.	Application (Level K3)
CO5: Analyzing the nature of sets under limits and continuity.	Analysis (Level K4)

MUMC10	Linear Algebra
CO1: Recalling the definitions of Groups ,Fields and their properties	Comprehension (Level K2)
CO2: Understanding the basic ideas of vector spaces and the concepts of span, linear independence basis dimension and to apply these concepts to vector spaces and subspaces .	Knowledge (Level K1)
CO3: Solving systems of linear equations and to reduce the augmented matrix and Compute the characteristic polynomial, eigenvalues and eigenvectors	Comprehension (Level K2)
CO4: Computing inner products and determine orthogonality on vector spaces, including Gram-Schmidt orthogonalization.	Application (Level K3)
CO5: Applying the principles of matrix algebra to linear transformations	Analysis (Level K4)
MUMCP11 Programming in C	
CO1: Understand the use of structured program development in C as applied to small programming projects.	Knowledge (Level K1)
CO2: Analyze the use of decision making statement and loop structures	Comprehension (Level K2)
CO3: Gaining a high level understanding of the structure of C functions	Application (Level K3)
CO4: Acquiring knowledge about arrays & pointers	Analysis (Level K4)
CO5: Implementing an achievable practical applications and analyze	Synthesis (Level K6)
MUME1 Elective I (a) Operations Research – I	
CO1: Understanding the origin and development of Operations Research	Comprehension (Level K2)
CO2: Acquiring the knowledge of Transportation and Assignment problems	Knowledge (Level K1)
CO3: Understanding duality theorems and dual simplex method.	Comprehension (Level K2)
CO4: Using the Simplex Method or the Big M Method to solve linear programming problems	Application (Level K3)
CO5: Analyzing the concept of complementary slackness and its role in solving primal / dual problem.	Analysis (Level K4)
MUME1 Elective I (b) Combinatorics	
CO1: Understanding the principles of Inclusion and Exclusion	Comprehension (Level K2)
CO2: Acquiring knowledge in Recurrence Relations	Knowledge (Level K1)
CO3: Understanding the ideas of permutations and combinations	Comprehension (Level K2)

CO4: Applying combinatorial ideas to practical problems	Application (Level K3)
CO5: Identifying knowledge about the Generalization of the pigeonhole principle	Analysis (Level K4)

MUME2 Elective II (a) Numerical Methods	
CO1: Understanding the basic definitions and meaning of interpolation	Comprehension (Level K2)
CO2: Acquiring knowledge about the basic concepts of numerical algorithms using appropriate technology	Knowledge (Level K1)
CO3: Understanding the numerical methods for approximating the solution of the problems of algebraic and transcendental equations, ordinary differential equations	Comprehension (Level K2)
CO4: Solving the ordinary differential equations by using the methods like Euler's, Runge Kutta, Modified Euler and Improved Euler.	Application (Level K3)
CO5: Comparing the viability of different approaches to the numerical solution of problems arising in roots of solution of non-linear equations, interpolation and approximation, numerical differentiation and integration, solution of linear systems	Analysis (Level K4)

MUME2 Elective II (b) Discrete Mathematics	
CO1: Discussing the primary concepts of Lattices	Comprehension (Level K2)
CO2: Acquiring knowledge about the basic concepts of Discrete Mathematics and its applications	Knowledge (Level K1)
CO3: Understanding abstract algebra, posets, lattices, Boolean algebra and their applications in the field of engineering and computer science	Comprehension (Level K2)
CO4: Applying logically valid forms of arguments to avoid logical errors by studying mathematical logic	Application (Level K3)
CO5: Analyzing the concepts of mathematical logic and relation	Analysis (Level K4)

MUMNU5 Numerical Problems Using C- Programming- Practical	
CO1: writing C programs to solve numerical, algebraic and transcendental equations and to solve simultaneous linear equations using numerical methods	Comprehension (Level K2)
CO2: Designing and implementing programs using C	Application (Level K3)
CO3: Learning to rectify the errors in 'C' Programming	Comprehension (Level K2)
CO4: Solving Ordinary Differential Equations numerically and Interpolation	Application (Level K3)
CO5: Creating application using C programming language	Synthesis (Level K6)

MUMC12	Complex Analysis
CO1: Understanding the geometric representation of complex numbers	Comprehension (Level K2)
CO2: Identifying the isolated singularities of a function and determine whether they are removable, poles, or essential	Knowledge (Level K1)
CO3: Understanding the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations	Comprehension (Level K2)
CO4: Applying the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra	Application (Level K3)
CO5: Analyzing functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem	Analysis (Level K4)
MUMC13	Graph Theory
CO1: Understanding the basic definitions to write the proofs of simple theorems	Comprehension (Level K2)
CO2: Identifying vertices, edges and paths with specific properties such as cut vertices, bridges, Eulerian, etc	Knowledge (Level K1)
CO3: Understanding the Concept of Eulerian graphs , Hamiltonian graphs and Planar graph	Comprehension (Level K2)
CO4: Relating real life situations with mathematical graphs	Application (Level K3)
CO5: Developing the ability to solve problems in graph theory	Analysis (Level K4)
MUMCP14	Object Oriented Programming With C++
CO1: Explaining object oriented concepts and describe how they are supported by C++	Comprehension (Level K2)
CO2: Identifying the concept of classes and objects	Knowledge (Level K1)
CO3: Understanding the practice of object oriented programming in the construction of robust maintainable programs which satisfy the requirements	Comprehension (Level K2)
CO4: Applying C++ programming and program development within an integrated development environment	Application (Level K3)
CO5: Analyzing the use of operator overloading and type conversions	Analysis (Level K4)
MUME3	Elective III (a) Operations Research-II
CO1: Understanding the concept of Replacement problems	Comprehension (Level K2)
CO2: Remembering various techniques to solve real life problems	Knowledge (Level K1)
CO3: Understanding the theory of games for solving simple games	Comprehension (Level K2)

CO4: Applying the fundamental concept of inventory control and some of the Queuing models	Application (Level K3)
CO5: Analyzing distinction between PERT & CPM	Analysis (Level K4)

MUME3	Elective III (b) Astronomy
CO1: Defining the spherical trigonometry of the celestial sphere	Comprehension (Level K2)
CO2: Identifying the basic knowledge of the Moon	Knowledge (Level K1)
CO3: Understanding the concept of solar and lunar ellipses	Comprehension (Level K2)
CO4: Applying the concept of Kepler's laws of planetary motion	Application (Level K3)
CO5: Analyzing the variation in duration of day and night in various zones of earth	Analysis (Level K4)

MUMPR	Project
CO1: Choosing a new topic of their interest	Comprehension (Level K2)
CO2:Developing communication skills through oral presentation	Analysis (Level K4)
CO3:Expressing their views with confidence in a group	Comprehension (Level K2)
CO4: Relating with the group members and reap the best harvest	Application (Level K3)
CO5:Developing the attitude of studying a topic in depth independently	Analysis (Level K4)

MUMN2	Quantitative Aptitude – II
CO1: Using percentage concept to solve applied technical problems	Application (Level K3)
CO2: Remembering the meaning of BODMAS rule	Knowledge (Level K1)
CO3: Understanding the concept of percentage on simple problems.	Comprehension (Level K2)
CO4: Applying the concept of time and work on real life problems	Application (Level K3)
CO5: Analyzing the problem on trains with solved examples	Analysis (Level K4)

EXTRA CREDIT PAPERS

UGEMCE	Mathematical Aptitude for Competitive Examinations
CO1: Using percentage concept to solve applied technical problems	Application (Level K3)
CO2: Identifying the Coding and decoding , to solve the Blood relationship problems	Knowledge (Level K1)
CO3: Understanding the concept of permutation and combinations	Comprehension (Level K2)
CO4: Applying the concept of logical and to be logical, stop guessing.	Application (Level K3)
CO5: Analyzing the data and solve the problems in banker's	Analysis (Level K4)

discount	
UGEQA Quantitative Aptitude	
CO1: Learning Volume and Area of Solid figures	Comprehension (Level K2)
CO2: Remembering the meaning of Partnership-Ratio and Division of gains	Knowledge (Level K1)
CO3: Understanding the concepts of Area of Elevation and Depression	Comprehension (Level K2)
CO4: Applying the concepts of Trigonometrical Identities	Application (Level K3)
CO5: Analyzing the concepts of heights and distance	Analysis (Level K4)
UGESTL Set Theory And Logic	
CO1: Learning Logical Equivalence and Algebra of Propositions	Comprehension (Level K2)
CO2: Remembering the Basic set operations	Knowledge (Level K1)
CO3: Understanding the concepts of Tautology and Contradiction.	Comprehension (Level K2)
CO4: Applying the concepts of conjunction – disjunction	Application (Level K3)
CO5: Analyzing the concepts of Equivalence relation	Analysis (Level K4)
VALUE ADDED COURSES	
Vedic Mathematics	
CO1: understand the concept of High Speed Multiplication and Faster Division	Knowledge (Level K1)
CO2: apply the speed method to calculate the Square Roots, Cube Roots and Digital Roots	Comprehension (Level K2)
CO3: Solve Maths problems faster and more efficient	Application (Level K3)
CO4: Sharpen mind, increases mental agility and intelligence	Analysis (Level K4)
Coding Theory	
CO1: understand the concept of Error detection, correction and decoding	Knowledge (Level K1)
CO2: apply the concept of Linear Codes , Hamming weight and Bases for linear codes	Comprehension (Level K2)
CO3: get a clear idea about the concepts of Finite Fields	Application (Level K3)
CO4: understand the concept of Generator matrix and Check matrix	Analysis (Level K4)
Mathematics for Environmental Studies	
CO1: Understand the concept of Fibonacci numbers in nature	Knowledge (Level K1)
CO2: Study the Different types of Fibonacci and Lucas numbers and its applications.	Comprehension (Level K2)
CO3: apply the concepts of golden ratio	Application (Level K3)
CO4: Analyze the concept of Gattei's discovery of golden ratio	Analysis (Level K4)