

# **PROGRAM AND COURSE OUTCOMES**

### **DEPARTMENT OF MATHEMATICS**



## WMO Arts & Science College, Muttil

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#### **BSc MATHEMATICS**

### **Course Outcomes**

Semester	Course	Course outcomes
1	MTS1B01- Basic logic	• Understand the foundations of mathematics and the
	and Number theory	importance of logic
		• Be able to prove results involving divisibility, greatest
		common divisor, least common multiple and identify some
		applications
		• Understands the theory and method of solutions of LDE
		• Solves linear congruent equations, learn classical theorems
		in Number theory
2	MTS2B02- Calculus of	• Get fundamental ideas of limit, continuity and
	one variable – 1	differentiability
		• Understands basic theorems and applications of
		differential calculus
		• Applies of differential calculus in real life situations
		• Learn fundamental theorems of Integral Calculus
3	MTS3B03- Calculus of	• Understands Exponential and Logarithmic functions and
	Single variable - 2	its applications
		• Learn improper integrals their convergence and
		evaluation.
		• Understand convergence of a series and become able to
		apply various tests to check the convergence
		• Learn about plane and space curves and applies vectorsin
		dealing with the problems involving geometry of lines,
		curves, planes and surfaces in space and acquire the
		ability to sketch curves in plane and space given in vector
		form
4	MTS4B04 – Linear	• Get idea of linear systems of equations,
	Algebra	• Vector spaces and linear transformations.
		• Understand various methods for solving a system of
		linear equations
		• Establish the connection between Matrices and linear
		transformations
		• Learn a few fundamental results involving diagonalization
		and eigenvalues which enable them to check whether
		diagonalization is possible
		• Study spectral decomposition of a symmetric matrix
		Understand Gram-Schmidt process
5	MTS5 B05 - Abstract	• Understands the abstract notion of a group, with several

	Algebra	examples
		• Learns to check whether an algebraic system forms a group or not and some fundamental results of group
		theory.
		• Establish the importance of permutation groups
		• Explores the idea of structural similarity, the notion of
		cyclic group, permutation group, various examples and
		fundamental results in the areas O
		• Observe the connection emerging between classical
		algebra and modern algebra.
6	MTS5 B06 - Basic	• Get basic ideas an methods of real and complex analysis
	Anarysis	<ul> <li>Understand axiomatic approach to learn real number system</li> </ul>
		• Learn to prove Archimedean property, density theorem,
		existence of irrational numbers
		• Study about basic topological properties of real number
		system such as the concept of open and closed sets, their
		properties and their characterization
		• Understands algebraic, geometric and topological
		structures of complex number system, functions of
7	MTS5 B07- Numerical	Learn several methods like bisection method, fixed point
,	Analysis	iteration method, regulafalsi method etc. to find out the
		approximate numerical solutions of algebraic and
		transcendental equations with desired accuracy
		• Understand the concept of interpolation and also learn
		some well known interpolation techniques
		• Master a few techniques for numerical differentiation and
		integration and also realizes their merits and demerits.
		Apply numerical approximations to solutions of initial
		value problems and also to understand the efficiency of
Q	MTS5 B08 Lincor	Various methous.     Solve linear programming problems geometrically.
0	Programming	<ul> <li>Solve finear programming problems geometrically</li> <li>Understand the drawbacks of geometric methods</li> </ul>
		<ul> <li>Solve I P problems more effectively using Simpley</li> </ul>
		algorithm via the use of condensed tableau of A W
		Tucker
		• Convert certain related problems, not directly solvable by
		simplex method; into a form that can be attacked by
		simplex method.
		• Understand duality theory, a theory that establishes
		relationships between linear programming problems of
		maximization and minimization

		• Understand game theory
		• Solve transportation and assignment problems by
		algorithms that take advantage of the simpler nature of
		these problems
9	MTS5 B09 -	Recognize and classify conics
	Introduction to	<ul> <li>Understand Kleinian view of Euclidean geometry</li> </ul>
	Geometry and Theory	<ul> <li>Understand affine transformations, the inherent group</li> </ul>
	of Equations	structure the idea of parallel projections and the basic
		properties of parallel projections
		• Learns the relationship between the roots and coefficients
		• Learns the relationship between the roots and coefficients
		for the roots of such a polynomial
		for the foots of such a polynomial.
		• Derive formulae for the solutions of third and fourth
		degree polynomial equations given by Carden and Ferrari
		• Locate the region of solutions for a general polynomial
		• Learns methods to find out integral and rational roots of a
		general <i>nth</i> degree polynomial with rational coefficients
10	MTS6 B10 - Real	• Explore the study on continuous functions, formulate
	Analysis	sequential criteria for continuity and proves or disproves
		continuity of functions using this criteria.
		• Understand the significance of uniform continuity
		Learn Riemann integrability of real valued functions
		• Formulates Cauchy criteria for integrability and use it to
		prove the non integrability of certain functions.
		• Understand two forms of fundamental theorem of calculus
		and their significance in the practical problem of
		evaluation of an integral
		• Understand the difference between point wise and uniform
		convergence of sequences and series of functions
		• Learns the properties of and relationship between
		improper integrals namely beta and gamma functions that
		frequently appear in mathematics, statistics, science and
		engineering
11	MTS6 B11- Complex	• Understand the difference between differentiability and
	Analysis	analyticity of a complex function and construct examples
		• Learn necessary and sufficient condition for checking
		analyticity
		• Understand definition of complex integral, its properties,
		evaluation and applications
		• Understand and apply Cauchy's integral formula and a
		few consequences of it such as Lowville's theorem,
		Morera's theorem and its applications
		• Understand how Laurent's series expansion lead to the

		concept of <i>residue</i> , which in turn provide another fruitful
		way to evaluate complex integrals
		• Learn application of residue theory in locating the region
		of zeros of an analytic function.
12	MTS6 B12 - Calculus of	<ul> <li>Understands several contexts of appearance of</li> </ul>
12	Multivariable	multivariable functions and their representation using
		graph and contour diagrams
		<ul> <li>Understands the notion of partial derivative their</li> </ul>
		computation and interpretation
		<ul> <li>Calculate the extreme values of a multivariable function</li> </ul>
		• Calculate the extreme values of a mutuvaliable function
		using second derivative test and Lagrange multiplier
		• Understand the idea of line integral and surface integral
		and their evaluations
		• Learn three major results viz. Green's theorem, Gauss's
		theorem and Stokes' theorem of multivariable calculus
12		and their uses in several areas and directions
13	MIS6 B13- Differential Equations	• Identify a number of areas where modeling process
	Differential Equations	results in a differential equation
		• Learn to solve DEs that are in linear, separable and in
		exact forms and also to analyze the solution
		• Realise the basic differences between linear and non linear
		DEs and also basic results that guarantees a solution in
		each case
		• Become familiar with the theory and method of solving a
		second order linear homogeneous and nonhomogeneous
		equation with constant coefficients
		• Acquire the knowledge of solving a differential equation
		using Laplace method
		• which is especially suitable to deal with problems arising
		in engineering field
		• Learn the technique of solving partial differential
		equations using the method of separation of variables
14	MTS6 B14 (E01)-	• Learn the definition of a graph, Graphs as models, Vertex
	Graph Theory	degrees, Sub graphs, Paths and Cycles, Matrix
		representation of a graph
		<ul> <li>Understand Bridges, Spanning Trees Cut Vertices and</li> </ul>
		Connectivity and applies in solving problems
		• Learn and apply Euler Tour, Hamiltonian Graphs, Plane
		and Planar graphs and Euler's Formula
15	MTS5 D04 –	Get an overview of Data collection, Data Classification
	Mathematics for	and Experimental Design
	Decision Making	• Learn frequency distributions and their graphs

		Study on Measures of Central Tendency, Measures of
		Variation and Dispersion
		Learn Concepts of Probability and Counting
		Understand probability distributions
16	MTS 1 C01 - Mathematics	• Understand concepts of limits, continuity, derivative and linear approximation of curves
		• Learn basic theorems of differentiation and integration
		<ul> <li>Apply the concepts in solving optimization problems in real life</li> </ul>
		<ul> <li>Understand the concepts of maximum and minimum</li> </ul>
		values of functions using graphs and find the extreme
		• Learn to draw graphs of functions
		• Apply integral calculus to find area, surface area, volume of solids etc.
17	MTS 2 C02 -	• Understand the concepts of polar coordinates,
	Mathematics	trigonometric functions, hyperbolic functions, inverse hyperbolic functions
		• Learn parameterization of curves and apply the concept of polar coordinates in finding areas, arc length and area between curves
		• Understand the ideas of improper integrals, their
		convergence, convergence of series and Taylor's formula
		• Understand the concepts of vector space
		<ul> <li>Apply the concepts of eigenvalues and eigenvectors in diagonalisation</li> </ul>
18	MTS3 C03 -	Learn fundamental ideas of limits, continuity,
	Mathematics	differentiability of vector valued functions
		• Understand the concepts of curl and divergence of vectors
		• Apply the concepts of multiple integrals in finding surface area, volume, flux
19	MTS4 C04	• Understands the ODE, its solutions, Initial value problem and different types of ODE.
		<ul> <li>Apply Laplace transforms and inverse transform for solving ODE</li> </ul>
		Understand the concents of Fourier series and its
		convergence
		• Learn the methods of solving partial differential equations.