V. V. COLLEGE OF SCIENCE & TECHNOLOGY

(Affiliated to University of Calicut)

Chullimada, Kanjikode, Palakkad.

DEPARTMENT OF MATHEMATICS

PROGRAM OUTCOMES

On completion of the BSc Degree the Mathematics graduates will be able to

PO1: Acquires the ability to understand and analyze the problems.

PO2: Develops the skill to think critically on abstract concepts of Mathematics.

PO3: Acquires the ability to think independently paving way for life long learning

PO4: Analyses the situation, make a mathematical problem and find its solution.

PO5: Enhances Logical reasoning skills, arithmetic skills, aptitude skills communication skills, self confidence for better employability.

PO6: Formulates and develops mathematical arguments in logical manner.

PO7: Provides a systematic understanding of the concepts and theories of mathematical and computing their application in the real world.

PO8: Prepare students for prominent career in industry, banks, offices and for further academic study.

PO9: provides a post graduate course, suitable for students of high ability, combining and relating mathematics, science and technology

PO10: Creating the relationship of mathematics with other subjects.

PO11: Application of various distributions to real life situation.

PO12: Acquainting with some basic concepts of probability.

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DEPARTMENT OF MATHEMATICS

COURSE OUTCOMES

FIRST SEMESTER

MTS1 B01 BASIC LOGIC & NUMBER THEORY

Course outcomes:

CO1 : Prove results involving divisibility, greatest common divisor, least common multiple and a few applications.

CO2 : Understand the theory and method of solutions of LDE.

CO3 : Solve linear congruent equations.

CO4 : Learn three classical theorems viz. Wilson's theorem, Fermat's little theorem and Euler's theorem and a few important consequences.

SECOND SEMESTER

MTS2 B02 CALCULUS OF SINGLE VARIABLE-1

Course outcomes

CO1: Fundamental Theorem of Calculus, which not only gives a practical way of evaluating the definite integral but establishes the close connection between the two branches of Calculus.

CO2: The notion of definite integral not only solves the area problem but is useful in finding out the arc length of a plane curve, volume and surface areas of solids and so on.

CO3: The integral turns out to be a powerful tool in solving problems in physics, chemistry, biology, engineering, economics and other fields.

THIRD SEMESTER

MTS3 B03 CALCULUS OF SINGLE VARIABLE2

Course outcomes

CO1 : They arise naturally when we model the growth of a biological population, the spread of a disease, the radioactive decay of atoms, and the study of heat transfer problems and so on.

CO2 : This enables to study a related notion of convergence of a series, which is practically done by applying several different tests such as integral test, comparison test and so on.

CO3 : This enables them to directly calculate the arc length and surface areas of revolution of a curve whose equation is in polar form.

CO4 : The students will be able to handle vectors in dealing with the problems involving geometry of lines, curves, planes and surfaces in space and have acquired the ability to sketch curves in plane and space given in vector valued form.

FOURTH SEMESTER

MTS4 B04 LINEAR ALGEBRA

Course outcomes

CO1 : Prove algebraic statements about vector addition, scalar multiplication, inner products, projections, norms, orthogonal vectors, linear independence, spanning sets, subspaces, bases, and dimension for R n and abstract vector spaces.

CO2 : Write the relationships between A being invertible, det A, AX = 0 having a solution, the rank of A, and the rows of A being linearly independent and Find the

kernel, range, rank, and nullity of a linear transformation. Find the change-of-basis matrix. Calculate eigenvalues and their corresponding eigenspaces. Determine if a matrix is diagonalizable, and if it is, diagonalize it.

CO3 : Use the Gram-Schmidt process to orthogonalize matrices.

FIFTH SEMESTER

MTS5 B05 ABSTRACT ALGEBRA

Course outcomes

CO1:. The abstract definition of a group, and be familiar with the basic types of

Examples, including numbers, symmetry groups and groups of permutations and

Matrices. The state axioms of groups, rings and field.

CO2: What subgroups are, and be familiar with the proof of Lagrange's Theorem.

CO3: The concept of group homomorphism and isomorphism

CO4: Study about Rings and its concepts.

MTS5 B06 BASIC ANALYSIS

Course outcomes

CO1:to learn and deduce rigorously many properties of real number system by assuming a few fundamental facts about it as axioms. In particular they will learn to prove Archimedean property, density theorem, existence of a positive square root for positive numbers and so on and the learning will help them to appreciate the beauty of logical arguments and embolden them to apply it in similar and unknown problems..

CO2:to know about sequences ,their limits, several basic and important theorems involving sequences and their applications . For example, they will learn how monotone convergence theorem can be used in establishing the divergence of the

harmonic series, how it helps in the calculation of square root of positive numbers and how it establishes the existence of the transcendental number e (Euler constant)..

CO3: to understand some basic topological properties of real number system such as the concept of open and closed sets, their properties, their characterization and so on..

CO4: to get a rigorous introduction to algebraic, geometric and topological structures of complex number system, functions of complex variable, their limit and continuity and so on. Rich use of geometry, comparison between real and complex calculus-areas where they agree and where they differ, the study of mapping properties of a few important complex functions exploring the underlying geometry will demystify student's belief that complex variable theory is incomprehensible.

MTS5 B07 NUMERICAL ANALYSIS

Course outcomes

CO1:Understand several methods such as bisection method, fixed point iteration method, regula falsi method etc. to find out the approximate numerical solutions of algebraic and transcendental equations with desired accuracy.

CO2: Understand the concept of interpolation and also learn some well known interpolation techniques.

CO3: Understand a few techniques for numerical differentiation and integration and also realize their merits and demerits.

CO4: Find out numerical approximations to solutions of initial value problems and also to understand the efficiency of various methods.

MTS5 B08 LINEAR PROGRAMMING

Course outcomes

CO1 :solve linear programming problems geometrically &understand the drawbacks of geometric methods

CO2: solve LP problems more effectively using Simplex algorithm via. the use of

condensedtableau of A.W. Tucker& convert certain related problems, not directly solvable by simplex method, into a form thatcan be attacked by simplex method.

CO3 : understand duality theory, a theory that establishes relationships between

linearprogramming problems of maximization and minimization

CO4: understand game theory solve transportation and assignment problems by

algorithms that take advantage of the simpler nature of these problems.

MTS5 B09 INTRODUCTION TO GEOMETRY AND THEORY OF EQUATIONS

Course Outcomes

CO1 : Understand several basic facts about parabola, hyperbola and ellipse (conics) such as their equation in standard form, focal length properties, and reflection properties, their tangents and normal. Recognise and classify conics.

CO2 : Understand Kleinian view of Euclidean geometry. Understand affine transformations, the inherent group structure, the idea of parallel projections and the basic properties of parallel projections. Understand the fundamental theorem of affine geometry.

CO3 : Learn to solve polynomial equations upto degree four.

SIXTH SEMESTER

MTS6 B10 REAL ANALYSIS

Course outcomes

CO1 : Able to develop more knowledge about continuous functions and Riemann Integrals.

CO2: Able to develop more knowledge about Sequence and Series of functions.

CO3 : Able to apply techniques to solve the Improper Integrals.

CO4 : Able to develop the knowledge about Beta and Gamma functions.

MTS6 B11 COMPLEX ANALYSIS

Course outcomes

CO1: To understand the difference between differentiability and analyticity of a complex function and construct examples.

CO2: To understand necessary and sufficient condition for checking analyticity.

CO3:To know of harmonic functions and their connection with analytic functions

CO4: To know a few elementary analytic functions of complex analysis and their properties.

CO5: To understand definition of complex integral, its properties and evaluation.

CO6: To know a few fundamental results on contour integration theory such as Cauchy's theorem, Cauchy-Goursat theorem and their applications.

CO7: To understand and apply Cauchy's integral formula and a few consequences of it such as Liouville's theorem, Morera's theorem and so forth in various situations.

CO8: To see the application of Cauchy's integral formula in the derivation of power series expansion of an analytic function.

CO9: To know a more general type of series expansion analogous to power series expansion viz. Laurent's series expansion for functions having singularity.

CO10: To understand how Laurent's series expansion lead to the concept of residue, which in turn provide another fruitful way to evaluate complex integrals and, in some cases, even real integrals.

CO11: To see another application of residue theory in locating the region of zeros of an analytic.

MTS6 B12 CALCULUS OF MULTI VARIABLE

Course outcomes

CO1: Understand several contexts of appearance of multivariable functions and their representation using graph and contour diagrams.

CO2: Formulate and work on the idea of limit and continuity for functions of Several variables.

CO3: Understand the notion of partial derivative, their computation and interpretation.

CO4: Understand chain rule for calculating partial derivatives.

CO5: Get the idea of directional derivative, its evaluation, interpretation, and relationship with partial derivatives.

CO6: Understand the concept of gradient, a few of its properties, application and interpretation.

CO7: Understand the use of partial derivatives in getting information of tangent plane and normal line.

CO8: Calculate the maximum and minimum values of a multivariable function using second derivative test and Lagrange multiplier method.

CO9: Find a few real life applications of Lagrange multiplier method in optimization problems.

CO10: Extend the notion of integral of a function of single variable to integral of functions of two and three variables.

CO11: Address the practical problem of evaluation of double and triple integral using Fubini's theorem and change of variable formula.

CO12: Realise the advantage of choosing other coordinate systems such as polar, spherical, cylindrical etc. in the evaluation of double and triple integrals

CO13: See a few applications of double and triple integral in the problem of finding out surfacearea ,mass of lamina, volume, centre of mass and so on.

CO14: Understand the notion of a vector field, the idea of curl and divergence of a vector field, their evaluation and interpretation.

CO15: Understand the idea of line integral and surface integral and their evaluations.

CO16: Learn three major results viz. Green's theorem, Gauss's theorem and Stokes' theorem of multivariable calculus and their use in several areas and directions.

MTS6 B13 DIFFERENTIAL EQUATIONS

Course outcomes

CO1: Students could identify a number of areas where the modeling process results in a Differential equation .They will learn what an ODE is, what it means by its solution, how to classify DEs, what it means by an IVP and so on.

CO2: They will learn to solve DEs that are in linear, separable and in exact forms and also to analyses the solution. They will realize the basic differences between linear and nonlinear DEs and also basic results that guarantee a solution in each case.

CO3: They will learn a method to approximate the solution successively of a first order IVP.They will become familiar with the theory and method of solving a second order linear homogeneous and non homogeneous equation with constant coefficients. They will learn to find out a series solution for homogeneous equations with variable Coefficients near ordinary points.

CO4: Students acquire the knowledge of solving a differential equation using Laplace method which is especially suitable to deal with problems arising in engineering field. Students learn the technique of solving**.**

MTS6 B14 (E01) GRAPH THEORY

Course outcomes:

CO1 : Able to know some important classes of graph theoretic problems

CO2: Able to formulate and prove central theorems about trees, matching, connectivity, coloring and planar graphs.

CO3 : Able to describe and apply some basic algorithms for graphs.

CO4 : Able to use graph theory as a modeling tool.

OPEN COURSE

MTS5 D04 MATHEMATICS FOR DECISION MAKING

Course outcomes

CO1: Acquire the knowledge about discrete and continuous distribution.

CO2: Understand the concepts and theories of various distributions.

CO3: Understand about random variables.

CO4: Acquainting with some basic concepts of probability.

COMPLIMENTARY COURSES

FIRST SEMESTER

MTS1 C01:MATHEMATICS-1

Course outcomes:

CO1 : Acquire ability to selection of various options and then can apply them to specific problems.

CO2: Able to understand numerical integration.

CO3 : Able to recognize the appropriate tools of calculus to solve applied problems.

CO4 : Able to to connect with the techniques
of integration and application of integration to physical problem.

SECOND SEMESTER

MTS2 C02: MATHEMATICS-2

Course outcomes:

CO1 : Able to numbers in polar form, can express hyperbolic, inverse hyperbolic functions.

CO2: Able to understand numerical integration.

CO3 : Able to apply the concept of Rank of matrices on problems of linear equations.

CO4 : Able to calculate eigen values and eigenvectors of linear operators**.**

THIRD SEMESTER

MTS3 C03:MATHEMATICS-3

Course outcomes:

CO1 : Able to apply techniques from multivariable analysis to set up and solve mathematical models, to deduce simple mathematical results, and to calculate integrals.

CO2: Able to integrate multivariable functions and vector fields over arbitrary curves in a plane or in space.

CO3 : Able to connects the line integral with the double integral.

CO4 : Able to compute contour Integration, to compute the Taylor and Laurent expansions.

FOURTH SEMESTER

MTS4 C04:MATHEMATICS-4

Course outcomes:

CO1 : Able to determine what function or functions satisfy the equation.

CO2: Able to find solution of higher-order linear differential equations.

CO3 : Able to reduces a linear differential equation to an algebraic equation

CO4 : Able to understand the Fourier Transform**.**