

DEPARTMENT OF MATHEMATICS

BSC (MPC, DS, MSCS, MPCS)

PROGRAMME OBJECTIVES

Students who choose 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 several interesting and useful ideas in preparations for several mathematics careers in education, research, government sector, business sector and industry. The course lays a structured foundation of Calculus, Real analysis, Abstract Algebra, Differential equations, Linear Algebra and Geometry. An exceptionally broad range of topics covering Pure & Applied Mathematics cater to varied interests and ambitions of the students. 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 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 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.
- Nurture problem solving skills, thinking, creativity through assignments, project work.
- Assist students in preparing (personal guidance, books) for competitive exams

SEMESTER: I

PAPER: DIFFERENTIAL CALCULUS

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:

- Understand concepts of limit and continuity on \mathbb{R} through ϵ - δ definition.
- Learn the conceptual variations when advancing in calculus from one variable to multivariable discussions.
- Sketch curves in a plane using its mathematical properties in the different coordinate systems of reference.

- Find the envelope of a given family of curves
- Find the evolutes and involutes and to find the radius of curvature using polar co-ordinates
- Learn the applications of mean value theorem and Taylor's theorem.
- Find the nth derivative, form equations involving derivatives and apply Leibnitz formula
- Find the partial derivative and total derivative coefficient
- Use the Lagrange's method of undetermined multipliers

SEMESTER: II

PAPER: DIFFERENTIAL EQUATIONS

COURSE OBJECTIVES

The main objectives of this course are to introduce the students to the exciting world of Differential Equations (Ordinary Differential equations) and their applications.

Course Learning Outcomes:

The course will enable the students to:

- Understand basic concepts of Differential Equations
- Solve first order linear and non-linear differential equation and linear differential equations of higher order using various techniques.
- Convert non exact homogeneous equations to exact differential equations by using integrating factors.
- Formulate, classify, and solve linear and non-linear partial differential equations using various methods; and apply these methods in solving some physical problems.
- Understand the concept and apply appropriate methods for solving differential equations.

SEMESTER: III

PAPER: REAL ANALYSIS

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 real numbers and real valued functions. These concepts have wide range of applications in real life scenario.

Course Learning Outcomes:

- 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.
- Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, and the limit of a bounded sequence.
- Apply the ratio, root, alternating series and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
- The geometrical properties of continuous functions on closed and bounded intervals.
- obtain the skills of analyzing the concepts and applying appropriate methods for testing convergence of a sequence/ series.
- Test the continuity and differentiability and Riemann integration of a function.
- Know the geometrical interpretation of mean value theorems.

SEMESTER: IV

PAPER: ALGEBRA

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.
- Lagrange's theorem on finite groups.
- Concept of Ring and Field and their homomorphism.

Course Learning Outcomes:

The course will enable the students to:

- Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc;
- Link the fundamental concepts of Groups and symmetrical figures;
- Explain the significance of the notion of cosets, normal subgroups, and factor groups.
- Get the behavior of permutations and operations on them.
- Study the homomorphisms and isomorphisms with applications
- Learn the fundamental concept of Rings, Fields, subrings, integral domains and the corresponding homomorphisms.
- Understand the applications of ring theory in various fields.

SEMESTER: V

PAPER: LINEAR ALGEBRA

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.
- Introduce the fundamental theory of vector spaces, and Linear Transformations.

Course Learning Outcomes:

This course will enable the students to:

- Find Rank and find eigenvalues and corresponding eigenvectors for a square matrix.
- Recognize consistent and inconsistent systems of linear equations by the row echelon form of the augmented matrix, using rank.
- Find matrix form of basic geometric transformations and interpretation of eigenvalues and eigenvectors of such transformations.
- Diagonalize square matrices and learn its applications.
- The fundamental concept of vector spaces with plenty of examples from different mathematical areas and the corresponding vector subspaces.
- 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.
- 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

PAPER: ANALYTICAL SOLID GEOMETRY

COURSE OBJECTIVES

The course aims at identifying and sketching curves, studying three dimensional objects, their geometric properties, and applications. Use of vector approach to three-dimensional geometry makes the study simple and elegant.

Course Learning Outcomes:

- Upon successful completion of this course, students should be able to:
- Distinguish the geometry of planes, lines, spheres, cones, and cylinders and describe their properties.
- Explain properties and concepts in 3D solid geometry and use them in real life situations
- Solve problems on planes, lines, spheres, cones, cylinders, and coincides by the acquired knowledge
- Analyze methods of solving problems on planes, lines and spheres and apply related method to solve them

Desipala

TSWRDC(W), Mancherla
Department of Mathematics

Surya
PRINCIPAL
TSWRDC(W), MANCHERLA
Dist: Mancherla