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|---|---|---|---|
| **Semester** | **:** | **I** | |
| **Course No.** | **:** | **MATH-111*** | **Credit Hrs. : 2(2+0) Need-based; G/NG** |
| **Course Title** | **:** | **Basic Mathematics** | |
| ***Gradial** Need-based Common Course for **B.Tech. (Biotechnology)**; ***Non-Gradial** Need-based Common Course for **B.Tech. (Agril. Engg.)** & **B.Tech. (Food Technology)** | | | |

## SYLLABUS

**Objectives**:

(i) To study the basic principles and functions in mathematics like limits and continuity,

(ii) To study differentiation and integration,

(iii) To study matrices and determinants.

## THEORY

**Functions**:

Function and types of functions, Limit: Introduction, left-handed and right-handed limits, Algebra of limits, Standard limits. Continuity: Definition of continuity, continuity of algebraic functions. Continuity of trigonometric and exponential functions.

**Differentiation:**

Differentiation by the first principle, Rules of Differentiation: sum, difference, product and quotient formulae, differentiation using the chain rule, differentiation of functions in parametric and implicit form, logarithmic differentiation, geometrical interpretation of derivative. Successive differentiation, maxima and minima.

**Integration:**

Definition of indefinite integrals, Integrals of elementary functions (Formulae only), Theorems of integration (without proof), Integration by substitution, integration by partial fractions, integration by parts, Definition of definite Integral with examples, properties of definite integral (without proof).

**Matrices and Determinants:**

Definition of determinants, example up to Third order determinant, properties of determinant (statements only), Definition of matrix, types of matrices, Algebra of Matrix (addition, subtraction and multiplication), inverse of matrix, Solution of linear equations by Crammer's rule.

## TEACHING SCHEDULE

### THEORY [MATH-111]

| Lecture No. | Topic | Subtopics/ Key Points | Weightage (%) |
|---|---|---|---|
| 1-5 | **Functions:** | Definition of Function, Types of functions | 15 |
| | | Some Basic Functions: Definition and Properties of: Constant Function, Identity Function, Power Function. Polynomial Function, Linear, quadratic and cubic function, Radical Function, Rational Function. Exponential, Logarithmic and Trigonometric Function | |
| | **Limit:** | Introduction, Definition of Limit, left-handed and right-handed limits, Algebra of limits | |
| | | Standard limits: Method of Factorization, Rationalization, Limit of Trigonometric, Exponential Logarithmic and Functions. Limit of Infinity | |
| | **Continuity:** | Definition of continuity, Continuity of algebraic functions, Continuity of trigonometric and exponential functions. | |
| 6 -15 | **Differentiation:** | Definition, Differentiation by the first principle, Derivative of Some standard functions (Formulae only), Rules of Differentiation (Sum, Difference, Product and quotient without proof), Differentiation using the chain rule, Differentiation of functions in parametric and implicit form, Logarithmic Differentiation, Successive differentiation, Maxima and minima | 30 |
| 16 -25 | **Indefinite and Definite Integration**: | Definition of indefinite Integral, Integrals elementary functions (Formulae only) Theorems of integration (without proof) Methods of Integration: Integration by Substitution, Integration by parts, Integration by partial fractions Some special integrals formulae only. Definition of definite Integral with examples Properties of definite integral (Without proof) | 30 |
| 26 -32 | **Determinants and Matrices:** | Definition of determinants, Expansion up to third order determinant, Properties of determinant (statements only) Definition of matrix, Order of Matrix, Types of matrices, Algebra of Matrices, Inverse of matrix by elementary transformations, Solution of linear equations by Crammer's rule | 25 |
| | | Total= | **100** |

**Suggested Readings:**


1. NCERT, 2012, Mathematics of Class XII, NCERT, India.
2. A Textbook of Mathematics XI and XII (Part I and II) Maharashtra State Board of Secondary and Higher Secondary Education, Pune.
3. Sharma RD, 2014, Mathematics of Class XII, Dhanpat Rai Publisher.