

APPLIED MATHEMATICS – II

RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and Integral calculus and Operations Research have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Calculate the effect of one variable with respect to another variable and write the equation of tangent and normal to a curve at a point by understanding and application of basics concepts of derivatives. After understanding the concept of derivatives they will be able to calculate the maximum and minimum values of a function.
- Calculate the area of a curve bounded by axes, by understanding the applications of basic concepts of integration. They will also be able to find the velocity from acceleration and displacement from velocity.
- Evaluate complex integrals in a simpler way by applying definite integral.
- Calculate the approximate area under a curve by applying Numerical Integration by using Trapezoidal and Simpson's Rules.
- Optimize the utilization of limited resources by applying basics concepts of Linear Programming.
- Solve Engineering and Industrial Problems by understanding and applying the solution of differential equations.
- Apply differential Equations and Numerical methods for higher learning of Mathematics and Engineering Applications.

DETAILED CONTENTS

1. Differential Calculus
 - 1.1 Definition of function; Concept of limits (Introduction only).
 - 1.2 Standard Differentiation of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$ and related formula.
 - 1.3 Differentiation of sum, product and quotient of functions, differentiation of implicit functions, differentiation of parametric functions. Differentiation of function of a function.

- 1.4 Differentiation of trigonometric, inverse trigonometric functions. Logarithmic differentiation. Exponential differentiation, Successive differentiation (excluding nth order).
- 1.5 Application of differential calculus in:
- Rate Measures
 - Maxima and minima
 - Equation of tangent and normal to a curve (for explicit functions only)
2. Integral Calculus
- 2.1 Integration as inverse operation of differentiation with simple examples.
- 2.2 Standard integrals and related simple problems
- 2.3 Simple integration by substitution, by parts and by partial fractions (For linear factors only)
- 2.4 Evaluation of definite integrals (simple problems)
- $$\int_0^{\pi/2} \sin^n x \, dx, \quad \int_0^{\pi/2} \cos^n x \, dx, \quad \int_0^{\pi/2} \sin^m x \cos^n x \, dx$$
- Using formulae without proof (m and n being positive integers only).
- 2.5 Applications of integration for evaluation of area bounded by a curve and axes (Simple problem).
- 2.6 Numerical integration by Trapezoidal Rule and Simpson's 1/3rd Rule and 3/8th Rule.
3. Operations Research
- 3.1 Linear Programming Problems formulations.
- 3.2 Graphical Method
4. Differential Equations
- 4.1 Definition, order, degree of ordinary differential equations.

Formation of differential equation (up to 2nd order). Solution of Differential equations with Variable separation and Linear Differential equations.