I Year-II Semester		L	T	P	C
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MATHEMATICS-II (Mathematical Methods) (R161202)

Prerequisite Course: Operation of Scientific Calculator

Course Description and Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

CO	Course Outcomes	POs
1	Calculate a root of an algebraic and transcendental equations.	4
2	Establish the relation between the finite difference operators. Compute interpolating polynomial for the given data.	5
3	Solve ordinary differential equations numerically using Euler's and RK method.	5
4	Find Fourier series for certain functions.	4
5	Find Fourier transforms for certain functions.	4
6	Apply method of seperation of variables in one dimensional wave and heat equations and two dimensional Laplace equation.	5

Syllabus:

UNIT I:

Solution of Algebraic and Transcendental Equations:

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations).

UNIT II:

Interpolation:

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

UNIT III:

Numerical Integration and solution of Ordinary Differential equations:

Trapezoidal rule- Simpson's $1/3^{rd}$ and $3/8^{th}$ rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

UNIT IV:

Fourier Series:

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT V:

Applications of PDE:

Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

UNIT VI:

Fourier Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

TEXT BOOKS:

1. B.S.Grewal**,** Higher Engineering Mathematics, 43^{rd} Edition, Khanna Publishers.
2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

REFERENCE BOOKS:

1. Dean G. Duffy**,** Advanced engineering mathematics with MATLAB, CRC Press
2. V.Ravindranath and P.Vijayalakshmi**,** Mathematical Methods, Himalaya Publishing House.
3. Erwin Kreyszig**,** Advanced Engineering Mathematics, 10^{th} Edition, Wiley-India
4. David Kincaid, Ward Cheney, Numerical Analysis-Mathematics of Scientific Computing, 3^{rd} Edition, Universities Press.
5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
6. Dass H.K., Rajnish Verma. Er**.,** Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.