

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Civil Engineering
Semester	III	Version	2.0.0.1
Effective from Academic Year	2026-27	Effective for the batch Admitted in	July 2025
Subject code	2BS3203	Subject Name	Mathematics for Civil Engineering
Teaching scheme			Examination scheme (Marks)
(Per Week)	Lecture (DT)		Practical (Lab.)
	L	TU	P TW
Credit	3	1	0 0 4
Hours	3	1	0 0 4
			CE SEE Total
			40 60 100
			0 0 0

Pre-requisites:

Basic knowledge of Differentiation, Integration and Differential Equations

Course Outcome (COs):

CO	Description
CO1	Apply Laplace Transform techniques to solve ordinary linear differential equations and simultaneous equations, including problems arising in engineering and electrical circuit applications.
CO2	Analyze and solve nonlinear algebraic equations using numerical methods such as Interval Halving, Newton–Raphson, Muller’s method, and related techniques.
CO3	Construct interpolating polynomials and curve-fitting models using Lagrange’s method, divided differences, and least-squares approximation for engineering data analysis.
CO4	Solve higher-order ordinary differential equations and simultaneous differential equations using standard analytical methods and apply them to engineering problems.
CO5	Formulate and solve partial differential equations and apply probability and statistical concepts to model engineering phenomena, uncertainty, and data variability.

Theory syllabus

Unit	Content	Hrs.
1	Laplace Transforms Definition, Laplace transform of elementary functions, Properties of Laplace transform, Inverse Laplace transform, transform of derivatives, Transform of integration, Multiplication by t^n , Division by t , Convolution theorem, Unit step and Heaviside’s unit function, direct-delta function, periodic functions, Solution of ordinary linear differential equations, Simultaneous equation with constant co-efficient applied to electrical circuits.	10
2	Solving Nonlinear Equations Interval halving revisited, Linear interpolation method, Newton’s method, Muller’s method, Newton’s Method for polynomial.	05
3	Interpolation and Curve Fitting Lagrangian polynomials, Divided difference, Least-Squares approximation.	05
4	Ordinary Differential Equation (Higher Order) Ordinary differential equation with constant coefficient, Variation of parameter methods, Cauchy – Euler differential equations, Simultaneous differential equations with constant coefficient, Applications of ordinary differential equation.	08
5	Partial Differential Equation Formation of partial differential equations, LaGrange’s first order partial differential equations, Directly integral equations, Method of separable of variables, Application to wave equations, Diffusion equation and Laplace equation.	10

6	Statistics Total probability, independent events, Theorem of compound probability, Baye's theorem random variable, Discrete probability distribution, Continuous probability distribution expectation, Moment generating function, Repeated trials, Binomial Poisson's and normal distribution applications, Calculation of errors, probable errors, standard error	07
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Practical content:

Assignments and tutorials are based on the above syllabus.

Text Books:

1.	Higher engineering mathematics. By B.S.Grewal.
2.	Textbook of Ordinary and Partial Differential Equations By M.D.Raisinghanian.
3	Advanced engineering mathematics By Erwin Kreyzing

Reference Books:

1.	Dr. K. R. Kachot, "Higher Engineering Mathematics", Vol.2, Mahajan Publication.
2.	Engineering mathematics. By Srivastava.
3,	Textbook of engineering mathematics By A.B.Mathur and V.P.Jaggi.

ICT/MOOCs:

1.	https://nptel.ac.in/courses/111105035/22
2.	https://nptel.ac.in/courses/111105035/27
3.	https://nptel.ac.in/courses/111105035/30
4.	https://nptel.ac.in/courses/111104031/8
5	https://nptel.ac.in/courses/111104031
6	https://nptel.ac.in/courses/111103021

Mapping of CO-PO and CO-PSO:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	2	1	0	0	0	0	0	0	1	3	2	0
CO2	3	3	1	2	1	0	0	0	0	0	0	1	3	2	0
CO3	2	2	3	2	2	0	0	0	1	1	0	1	2	3	0
CO4	3	3	1	3	1	0	0	0	0	0	1	1	3	2	0
CO5	3	3	3	3	2	1	1	0	0	0	0	2	3	3	0