

Engineering Mathematics – II (ODE, PDE and Multivariable Calculus)

Course Code	19BS1201	Year	I	Semester	II
Course Category	Basic Sciences	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Calculus&Algebra
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to	
CO1	solve the differential equations related to various engineering fields .
CO2	Solve the linear differential equation with constant coefficients.
CO3	identify solution methods for partial differential equations that model physical processes .
CO4	interpret the physical meaning of gradient, curl and divergence .
CO5	determine the work done against a force field, circulation and flux using vector calculus .

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2											1	
CO2	3	2											1	
CO3	3	2											1	
CO4	3	2											1	
CO5	3	2											1	

Syllabus

Unit No.	Contents	Mapped CO
I	Linear Differential Equations of Higher Order: Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.	CO1
II	Equations Reducible to Linear Differential Equations and Applications: Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.	CO2
III	Partial Differential Equations: First order partial differential equations, solutions of first order linear PDEs, Charpit's method, solutions to homogenous and non-homogenous linear partial differential equations.	CO3
IV	Multivariable Calculus (Vector Differentiation): Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities	CO4

V	Multivariable Calculus (Vector Integration): Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).	CO5
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Learning Resources

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books

- 1 R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

e- Resources & other digital material

www.nptelvideos.com/mathematics/
<https://nptel.ac.in/courses/111104025/>
<https://nptel.ac.in/courses/122101003/>