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

Course Code	19BS1201	**Year**	I	**Semester**	II
Course Category	Basic Sciences	**Branch**	CE	**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 (H:High, M: Medium, L:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	M											M	
CO2	H	M											M	
CO3	H	M											M	
CO4	H	M											M	
CO5	H	M											M	

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-	CO4

	Gradient, del applied to vector point functions-Divergence and Curl, vector identities	
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

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/