

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

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

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

<b>Contribution of Course Outcomes towards achievement of Program Outcomes &amp; Strength of correlations (H:High, M: Medium, L:Low)</b>														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	M											L	
CO2	H	M											L	
CO3	H	M											L	
CO4	H	M											L	
CO5	H	M											L	

<b>Syllabus</b>		
Unit No.	Contents	Mapped CO
I	<b>Linear Differential Equations of Higher Order:</b> Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.	CO1
II	<b>Equations Reducible to Linear Differential Equations and Applications:</b> 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	<b>Partial Differential Equations:</b> 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	<b>Multivariable Calculus (Vector Differentiation):</b> 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	<b>Multivariable Calculus (Vector Integration):</b> 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

<b>Learning Resources</b>	
<b>Text Books</b>	
1.	Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018
2.	B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
<b>Reference Books</b>	
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.
<b>e- Resources &amp; other digital material</b>	
<a href="http://www.nptelvideos.com/mathematics/">www.nptelvideos.com/mathematics/</a> <a href="https://nptel.ac.in/courses/111104025/">https://nptel.ac.in/courses/111104025/</a> <a href="https://nptel.ac.in/courses/122101003/">https://nptel.ac.in/courses/122101003/</a>	