Differential Equations and Vector Calculus
(Common to all branches)

Course Code	23BS1201	**Year**	**I**	**Semester**	II
Course Category	Basic Science	**Branch**	ECE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Pre- requisites**	NIL
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	**Interpret** the basic concepts of differential equations and vector calculus L2
CO2	**Apply** different methods to solve ordinary differential equations and partial differentialequations, L-C-R Circuit problems L3
CO3	**Apply** the differential operator to calculate the divergence and flux of vector point functions L3
CO4	**Analyze** the given ordinary differential equation and partial differential equation to find the solution L4
CO5	**Analyze** the given data to find work done; flux using line and surface integrals, areas and volumes using vectorintegral theorems L4

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

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO 1**	**PSO 2**
CO1	2											1	
CO2	3											1	
CO3	3											1	
CO4		3						1	1			1	
CO5		3						1	1			1	

Syllabus

Unit No.	**Contents**	**Mapped CO**
1	**Differential equations of first order and first degree** Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay.	CO-1,2,4
2	**Linear differential equations of higher order (Constant Coefficients)** Definitions, complimentary function, general solution, particular	CO-1,2,4

	integral, Wronskian, Method of variation of parameters. Applications to L-C-R Circuit problems.	
3	**Partial Differential Equations** Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.	CO-1,2,4
4	**Vector differentiation** Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl.	CO-1,3,5
5	**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) and related problems.	CO-1,3,5

Learning Resources
Text Books
1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers, 2017, 44th Ed. 2. Advanced Engineering Mathematics, Erwin Kreyszig,JohnWiley&Sons,2018,10th Ed.
Reference Books
1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Ed. 2. Dennis G. Zill and Warren S. Wright, Jones and Bartlett, Advanced Engineering Mathematics, 2018. 3. Glyn James, Advanced Modern Engineering Mathematics, Pearson publishers, 2018, 5th Ed. 4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science InternationalLtd., 2021 5th Ed. 5. Higher Engineering Mathematics, B.V.Ramana, Mc Graw Hill Education, 2017
e-Resources
1. https://nptel.ac.in/courses/111/105/111105121/ 2. https://nptel.ac.in/courses/111/105/111105122/ 3. https://nptel.ac.in/courses/111/107/111107108/