Course Code: 1BMAEC201 **Course: Applied Mathematics-II for Electronics and Communication Engineering**

Credits: 4 **L:T:P:S 3:2:0**
SEE: 50% Marks **CIE: 50% Marks**
SEE Hours: 3 Hrs **Max. Marks: 100**

Prerequisites if any	**Familiarize** the importance of Integral calculus and Vector calculus essential for civil engineering
Learning objectives	The goal of the course **A (1BMAEC201)** is to **1. Familiarize** the importance of Integral calculus and vector calculus essential for Electronics and Communication Engineering. **2. Develop** the knowledge of numerical methods to solve ECE problems.

Course Outcomes:
On the successful completion of the course, the student will be able to

	Course Outcomes	Bloom's level
CO1	Apply the concept of multiple integral to solve proper & improper integrals, To compute area and volume, to solve improper integrals using Beta-Gamma integrals.	Understand, Apply, Analyze
CO2	Apply the vector differential operator on scalar & vector fields and compute integrals using Green's and Gauss stokes theorem.	
CO3	Apply the knowledge of numerical methods in solving physical and engineering problems.	
CO4	Develop familiarity with modern mathematical tools namely SCILAB/PYTHON/MATLAB and stimulates creative problem solving through experiential learning.	

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	-	-	-	-	-	-	2		3	-	-	-
CO2	3	3	3	2	-	-	-	-	-	-	2		3	-	-	-
CO3	3	3	3	2	-	-	-	-	-	-	2		3	-	-	-
CO4	3	-	-	-	3	-	-	-	-	-	-		-	2	-	-

Strong: 3 **Medium: 2** **Low: 1**

Course Content

	Module – 1 Integral Calculus and its Applications	No. of Lecture Hours	No. of Tutorial Hours	Self-Learning Hours
1.1	Multiple Integrals: Evaluation of double and triple integrals.	2	1	
1.2	Change of order of integration.	1		
1.3	Changing to polar coordinates.	1	1	
1.4	Area and volume using double and triple integrals.	2		
1.5	Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.	2	1	
	Module – 2 Vector Calculus-I			
2.1	Vector Differentiation: Scalar and vector fields, gradient of a scalar field.	2	1	
2.2	Directional derivatives.	1		
2.3	Divergence of a vector field, solenoidal vector.	1		
2.4	Curl of a vector field, irrotational vector.	2	1	
2.5	Physical interpretation of gradient, divergence and curl and scalar potential.	2		
	Module – 3 Vector Calculus-II			
3.1	Vector Integration: Line integrals, work done by a force and flux, Surface and volume integrals.	2	1	
3.2	Green's theorem only problems (without proof).	2	1	
3.3	Stoke's theorem only problems (without proof).	2	1	
3.4	Gauss divergence theorem only problems (without proof).	2		
	Module –4 Numerical Methods-1			
4.1	Solution of algebraic and transcendental equations: Regula-Falsi method.	1		
4.2	Solution of algebraic and transcendental equations: Newton-Raphson method.	1	1	
4.3	Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton forward and backward interpolation formulae.	2		
4.4	Newton's divided difference interpolation formula.	1	1	
4.5	Lagrange's interpolation formula.	1		
4.6	Numerical Integration: Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule.	2		
	Module –5 Numerical Methods-2			
5.1	Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method.	2	1	
5.2	Modified Euler's method.	2		
5.3	Runge-Kutta method of fourth order.	2	1	
5.4	Rayleigh power method to determine the dominant eigen value of a matrix.	2		
	Total No. of Lecture Hours	40		
	Total No. of Tutorial Hours		12	
	Total No. of Self learning Hours			0

Textbooks:

1. **B. S .Grewal**: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books:

1. **B. V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017.
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. Gilbert strang, Linear algebra and its applications Fourth edition, Cengage, 2006.
4. Advanced engineering mathematics, Jain and Iyyengar, Narosa publications, 5th edition, 2002.
5. **Tom Apostol** "Calculus: Multi-Variable Calculus and Linear Algebra with applications to differential equations and Probability, Vol.2, Wiley publications, 2nd edition, 2007.

Online Resources:

1. https://www.youtube.com/watch?v=ixDGaEqWuA0.
2. https://www.youtube.com/results?search_query=nptel+linear+algebra.