Syllabus Template (First year of 25-26 entry Batch and second year of 24-25 entry Batch)

	Course Code	:	1BMAS201C	DIFFERENTIAL EQUATIONS AND NUMERICAL METHODS FOR CSE STREAM	Semester	:	II
	L:T:P	:	3 : 1 : 0		Course Type	:	BSC
Hours/Sem.	Teaching	:	42+28Hrs		CIE Marks	:	50
	Learning (TW+SL)	:	44Hrs		SEE Marks	:	50
	Exam	:	6Hrs		Total Marks	:	100
	Total Hrs.	:	120Hrs		Credits	:	04

Professional Competency:

Apply differential equations and numerical methods in engineering applications.

Course Outcomes

After the completion of the course student will be able to

CO1: Determine the solutions of first and higher-order differential equations using analytical methods.

CO2: Apply numerical methods to solve algebraic, transcendental equations and perform interpolation.

CO3: Apply numerical methods to find approximate solution of ordinary differential equations and numerical integration in engineering contexts.

CO4: Employ Numerical methods to solve system of linear equations

UNIT-I **11 Hrs.**

Differential Equations

Linear and Bernoulli`s differential equations. Exact and reducible to exact differential equations with integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients. Inverse differential operators - e^{ax}, sin(ax+b), cos(ax+b) and x^n. Cauchy's homogeneous differential equation.

UNIT–II **10 Hrs.**

Numerical Methods-1

Solution of algebraic and transcendental equations: Regular falsi and Newton-Raphson methods.

Finite differences, interpolation using Newton Gregary forward and Newton Gregary backward difference formulae, Newton's divided difference. Lagrange interpolation formulae.

UNIT–III **11 Hrs.**

Numerical Methods-2

Numerical integration: Trapezoidal rule, Simpson's 1/3rd rule, Simpson's 3/8th rule and Weddle's rule.

Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order.

UNIT–IV **10 Hrs.**

Numerical Solutions for System of Linear Equations

Norms: Vector norms and Matrix norms-L1, L2 and L∞, Ill conditioned linear system, condition number. Solution of system of linear equations: Jacobi's method, Gauss Seidel method and LU-decomposition method. Eigen values and Eigen vectors by Rayleigh power method.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEd.,2021.
2. Gilbert Strang, Linear Algebra and its Applications, Cengage Publications,4th Ed.,2022.
3. Seymour Lipschutz and Marc Lipson, Linear Algebra, Schaum's outlines series,4thEd.,2008.

Reference Books

1. V. Ramana, Higher Engineering Mathematics"McGraw-Hill Education,11th Ed.,2017
2. N.P Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Ed.,2022.
3. James Stewart, Calculus, Cengage Publications,7th Ed.,2019.
4. David Poole, Linear Algebra,a modern introduction, Cengage publishers,4th Ed.,2014.
5. David CLay, Linear Algebra and its Applications, Pearson Publishers,4th Ed.,2018.
6. Gareth Williams, Linear Algebra with applications, Jones Bartlett Publisher sInc.,6t h Ed.,2017

Web Links and Video Lectures:

https://drive.google.com/file/d/1KtCtZmnJnOvV1S68wXS9FZPXUFvRktBQ/view?usp=sharing

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	3 (WK1, WK2, WK3,and WK4)	2 (WK1, WK2 and WK3)						1			1		
CO2	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		
CO3	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		
CO4	3 (WK1, WK2, WK3, and WK4)	2 (WK1, WK2 and WK3)						1			1		

Sri B.V.V.S.
Basaveshwar Engineering College, Bagalkote
Scheme (from 2025-26)

Sl. No.	Course Code	Course Title	Teaching-Learning Scheme				Examination Duration (Hrs/Sem.)		Total Hours	Examination Scheme and Evaluation			Credits (C)= Total Hours /30
			L Hrs/ Week (Hrs/ Sem.)	T Hrs/ Week (Hrs/Sem.)	P Hrs/ Week (Hrs/Sem.)	Term Work (TW) and Self Learning (SL) (TW+SL) Hrs/ Sem.	CIE	SEE		CIE Marks	SEE Marks	Total Marks	
1	1BMAS201C	Differential equations and numerical methods for CSE stream	3(42)	28	0	44	3	3	120	50	50	100	4= 120 /30