



### Lesson Plan

**Program:** BCA      **Semester:** V      **Course Code:** 406      **Course Name:** Numerical Methods

#### Course Objectives

- (CO1):** To enumerate the fundamental knowledge of solving problems using Numerical Methods.
- (CO2):** To understand concept of Differentiation and Integration by Numerical Approach.
- (CO3):** To understand the Numerical Method in solving Linear Equation.
- (CO4):** To understand the concept of Differential Equation Numerical Method Approach.

**Session Duration:** 60 minutes

**Participants:** BCA Fifth Semester Students

#### Entry level knowledge and skills of students

- i. Basics of Functions
- ii. Basic Knowledge of Derivative
- iii. Basic knowledge of Scientific Calculator

#### Equipment required in Classroom/ Laboratory/ Workshop

- i. Projector
- ii. White Board & Marker

#### Assessment Schemes

S. No.	Criteria	Marks (100)
1	CCSU End Term Examination	75
2	Internal Evaluation Scheme	25
2(a)	Teacher Assessment (Continuous Evaluation) (Assignment & Attendance)	25
2(a)(i)	Assignment -1	10
2(a)(ii)	Assignment -2	10
2(a)(iii)	Attendance (compulsory)	5

**Course Outcomes** (starting with action-oriented observable and measurable verb)

- (CO1):** Able to solve the problems where exact solution of some problems is very hard to find, in that case approximate solution is found using Numerical Methods.      **Understanding (K2), Applying (K3)**
- (CO2):** Able to solve the problems of Differentiation and Integration using Numerical Methods.      **Understanding (K2), Applying (K3)**
- (CO3):** Able to solve the problem of System of Linear Equation where approximate solution exist using Numerical Methods      **Understanding (K2), Applying (K3)**
- (CO4):** Able to solve the problem of Differential Equation using Numerical Methods.      **Understanding (K2), Applying (K3)**



Sl. No.	Topics	Sub Topics	Date of implementation	Pedagogy	CO-Covered	Faculty Sign	HoD's Remark with Date
<b>Unit - 1</b>							
1.	Discussion about the Subject Syllabus and Learning outcomes	Course Objective & Course Outcome			CO-1 TO CO-4		
2.	Roots Of Equations	Bisections Method		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO1		
3.		Problem Exercise		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO1		
4.		False Position Method		<ul style="list-style-type: none"> <li>Lecture</li> </ul>	CO1		
5.		Problem Exercise		<ul style="list-style-type: none"> <li>Lecture</li> </ul>	CO1		
6.		Newton's Raphson Method		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO1		
7.		Problem Exercise		<ul style="list-style-type: none"> <li></li> </ul>			
8.		Rate of convergence of Newton's method		<ul style="list-style-type: none"> <li></li> </ul>			
9.		Revision of Unit-1		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO1		
10.		Discussed University questions		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO1		
<b>Unit - 2</b>							
11.	Interpolation and Extrapolation	Finite Differences, The operator E		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
12.	Newton's Forward and Backward Differences			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
13.		Practice of Question Using		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		



		Scientific calculator					
14.	Newton's dividend differences formulae			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
15.	Lagrange's Interpolation formula for unequal Intervals			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
16.	Gauss's Interpolation formula			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
17.		Practice of Question Using Scientific calculator		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
18.	Starling formula			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
19.	Bessel's formula			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
20.	Laplace-Everett formula			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
21.		Practice of Question Using Scientific calculator		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
22.		Practice session		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
23.		Revision of Unit-1		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO2		
24.		Discussed University questions		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO2		
25.		Class Test-1			CO2		
<b>Unit – 3</b>							
26.	Numerical Differentiation Numerical Integration	Introduction, direct methods		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO3		
27.		maxima and minima of a		<ul style="list-style-type: none"> <li>Lecture</li> </ul>	CO3		



		tabulated function		<ul style="list-style-type: none"><li>Brainstorming</li></ul>			
28.		General Quadratic formula		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO3		
29.		Trapezoidal rule		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO3		
30.		Exercise		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO3		
31.		Simpson's One third rule		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO3		
32.		Simpson's three- eight rule		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO3		
33.		Practice session		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO3		
34.		Revision of Unit-3		<ul style="list-style-type: none"><li>Discussion</li><li>Brainstorming</li><li>Buzz Grouping</li></ul>	CO3		
35.		Discussed University questions		<ul style="list-style-type: none"><li>Discussion</li><li>Brainstorming</li><li>Buzz Grouping</li></ul>	CO3		
<b>Unit - 4</b>							
36.	Solution of Linear Equation	Introduction To Linear Equation System of Linear Equation		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO4		
37.		Gauss's Elimination method		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO4		
38.		Exercise		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO4		
39.		Gauss's Siedel iterative		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO4		



		method					
40.		Revision of Unit-4		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO4		
41.		Discussed University questions		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO4		
<b>Unit – 5</b>							
42.	Introduction to Differential Equation	Formation of Differential Equation, Order and Degree		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
43.	Solution of Differential Equations	Euler's method		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
44.		Exercise		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
45.		Picard's method		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
46.		Exercise		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
47.		Fourth-order Runga – Kutta method		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
48.		Exercise		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
49.		Revision of Unit-4		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO5		
50.		Discussed University questions		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO5		
51.		Class Test					
<b>Revision</b>							
52.	UNIT-I			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO1		



53.	UNIT-II			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO1		
54.	UNIT-III			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO2		
55.	UNIT-IV			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
56.	UNIT-V			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO4		
57.	UNIT-VI			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO5		

**Reference Books:**

1. P. Kandasamy, "Numerical Methods", Chand (S.) & Co Ltd ,India (December 1, 2006).
2. S.S. Sastri, "Introductory Methods of Numerical Analysis", Gardners Books (July 31, 2004)
3. A.K.Vashist, "Numerical Analysis", Krishna Publication.
4. B.S. Grewal, "Numerical Methods in Engineering & Science: with Programs in C and C++", Khanna Publishers (January 1, 2010)
5. John H. Mathews and Kurtis D. Fink, Numerical Methods using MATLAB, 4th edition, PHI Learning Private Limited, New Delhi, 2007.