



### Lesson Plan

**Program:** BCA      **Semester:** IV      **Course Code:** 406      **Course Name:** Mathematics-III

**Course Objectives**

- (CO1):** To enumerate the fundamental knowledge of Complex Number and Complex Valued Function.
- (CO2):** To understand concept of Sequence and Series of Real Number, and their nature and properties
- (CO3):** To understand the concept of Vectors
- (CO4):** To understand the concept of Fourier series.
- (CO5):** To understand the concept of Differential Equation of First Order
- (CO6):** To understand the concept of Differential Equation of Higher Order

**Session Duration:** 60 minutes

**Participants:** BCA Fourth Semester Students

**Entry level knowledge and skills of students**

- i. Basics of Number System, General Idea of Vectors
- ii. Basic Knowledge of Functions and Differentiation of Function

**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 understand the concept of Complex Number and why complex number needed. *Understanding (K2), Applying (K3), Analysis (K4)*
- (CO2):** Able to understand the meaning of Sequence and Series and solving problems based on convergences and divergence *Understanding (K2), Applying (K3), Analysis (K4)*
- (CO3):** Able to understand the concept of Vectors Differentiation and its physical interpretation *Understanding (K2), Applying (K3), Analysis (K4)*
- (CO4):** Able to solve problem on Fourier series *Understanding (K2), Applying (K3), Analysis (K4)*
- (CO5):** Able to understand the concept of derivative, able to solve First Order Differential Equation Problem *Understanding (K2), Applying (K3)*



**(CO6):** Able to solve Higher Order Differential Equation Problem

*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-6		
2.	Introduction Complex Number System			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO1		
3.	Algebra of Complex Numbers, Polar Form			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO1		
4.	Powers and Roots, Functions of Complex Variables			<ul style="list-style-type: none"> <li>• Lecture</li> </ul>	CO1		
5.	Elementary Functions			<ul style="list-style-type: none"> <li>• Lecture</li> </ul>	CO1		
6.	Inverse Trigonometric Function.			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO1		
7.		Revision of Unit-1		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO1		
8.		Discussed University questions		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO1		
9.		Class Test-1			CO1		
<b>Unit - 2</b>							
10.	Introduction of Sequence			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO2		
11.	Finite and Infinite Sequences			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO2		
12.	Monotonic Sequence, Bounded Sequence			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO2		



13.	Limit of a Sequence, Convergence of a Sequence			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
14.	<b>Introduction to Series, Partial Sums</b>			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
15.	Convergent Series			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
16.	Theorems on Convergence of Series	statement, alternating series, conditional convergent		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
17.		Leibnitz Test, Limit Comparison Test		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
18.		Ratio Test, Cauchy's Root Test		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
19.		Convergence of Binomial and Logarithmic Series		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
20.		Raabe's Test, Logarithmic Test		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
21.		Cauchy's Integral Test		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO2		
22.		Revision of Unit-1		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO2		
23.		Discussed University questions		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO2		
24.		Class Test-1			CO2		
<b>Unit - 3</b>							
25.	Introduction to Derivative			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO3		
26.	Differentiation of Vectors			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO3		
27.	Scalar and Vector Fields			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO3		
28.	Gradient			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO3		
29.	Directional			<ul style="list-style-type: none"> <li>Lecture</li> </ul>	CO3		



	Derivatives			<ul style="list-style-type: none"> <li>Brainstorming</li> </ul>			
30.	Divergence, Curl			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO3		
31.		Revision of Unit-3		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO3		
32.		Discussed University questions		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO3		
33.		Class test-3					
<b>Unit - 4</b>							
34.	Introduction to Function	Function, Periodic function, Odd Even Functions		<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO4		
35.	Fourier series			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO4		
36.	Fourier Series of Even and Odd Functions			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO4		
37.	Range Series			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO4		
38.		Revision of Unit-4		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO4		
39.		Discussed University questions		<ul style="list-style-type: none"> <li>Discussion</li> <li>Brainstorming</li> <li>Buzz Grouping</li> </ul>	CO4		
40.		Class Test-4					
<b>Unit - 5</b>							
41.	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		
42.	Variable-Separable Method, Homogeneous Differential Equations			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO5		
43.	Exact Differential Equations, Linear Differential			<ul style="list-style-type: none"> <li>Lecture</li> <li>Brainstorming</li> </ul>	CO5		



	Equations						
44.	Bernoulli's Differential Equations, Differential Equations of First Order and First Degree by Integrating Factor			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO5		
45.		Revision of Unit-4		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO5		
46.		Discussed University questions		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO5		
47.		Class Test-1					
<b>UNIT-6</b>							
48.	Homogenous Differential Equations with Constant Coefficients			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO6		
49.	Cases of Complex Roots and Repeated Roots			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO6		
50.	Differential Operator, Solutions by Methods of Direct Formulae for Particular Integrals			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO6		
51.	Solution by Undetermined Coefficients			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO6		
52.	Cauchy Differential Equations			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO6		
53.	Operator Method for Finding Particular Integrals, (Direct			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO6		



	Formulae).						
54.		Revision of Unit-6		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO6		
55.		Discussed University questions		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO6		
56.		Class Test-6			CO6		

**Text Books:** H.K DAS “Mathematics-3”

**Reference Books:**

1. Complex Variables with Application :S. Ponnusamy,Herb Silverman
2. Real Analysis : N.P. Bali
3. Integral Equation and Boundary value Problems : M.D Raisinghania