



**Program:** BCA      **Semester:** II      **Course Code:** 201      **Course Name:** Mathematics-II

**Course Objectives**

- (CO1): To enumerate the fundamental knowledge of Sets
- (CO2): To understand concept of Functions & Relations
- (CO3): To understand the concept of POSET.
- (CO4): To understand the concept of Partial Derivative.
- (CO5): To understand the concept of Three Dimensional Space
- (CO6): To understand the concept of Multiple Integrals.

**Session Duration:** 60 minutes

**Participants:** BCA Second Semester Students

**Entry level knowledge and skills of students**

- i. Basics of Set Theory and Relation, Functions
- ii. Basic Knowledge of Differentiation and Integration 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 Sets, algebra of sets, Practical Life examples.  
**Understanding (K2), Applying (K3)**
- (CO2): Able to understand the meaning of Functions and Relation, their properties & related practical examples.  
**Understanding (K2), Applying (K3)**
- (CO3): Able to understand the concept of POSETS and their properties.  
**Understanding (K2), Applying (K3), Analysis (K4)**
- (CO4): Able to solve problem on Partial Derivative  
**Understanding (K2), Applying (K3), Analysis (K4)**
- (CO5): Able to understand the concept of Three Dimensional Space, geometrical meaning & properties.  
**Understanding (K2), Applying (K3), Analysis (K4)**
- (CO6): Able to solve Multiple Integrals Problems & its applications in finding area and volume.  
**Understanding (K2), Applying (K3), Analysis (K4)**



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 to sets	Sets, Subsets, Equal Sets, Universal Sets		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO1		
3.	Operation on Sets	Union, Intersection and Complement of a Set		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO1		
4.		Cartesian Product, Addition, Subtraction of two Sets		<ul style="list-style-type: none"><li>Lecture</li></ul>	CO1		
5.	Venn Diagram			<ul style="list-style-type: none"><li>Lecture</li></ul>	CO1		
6.	Cardinality of Set, Simple Applications			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO1		
7.		Revision 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		
<b>Unit - 2</b>							
9.	Introduction of Relation			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO2		
10.	Properties of Relations, Equivalence Relation			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO2		
11.	Partial Order Relation			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO2		
12.	Introduction of Function	Definition, Domain, Range		<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO2		
13.	Composite and Inverse Functions			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO2		
14.	Onto, Into and One to One			<ul style="list-style-type: none"><li>Lecture</li></ul>	CO2		



	Functions			<ul style="list-style-type: none"><li>• Brainstorming</li></ul>			
15.	Introduction of Trigonometric, Logarithmic and Exponential Functions	Tracing ,Properties		<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO2		
16.		Doubt Class		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO2		
17.		Discussed University questions		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO2		
18.		Class Test-1					
<b>Unit - 3</b>							
19.	Introduction to POSET			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
20.	Representation of POSETS using Hasse diagram			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
21.	Chains			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
22.	Maximal and Minimal Point			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
23.	Directional Derivatives			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
24.	Glb, lub,			<ul style="list-style-type: none"><li>• Lecture</li><li>• Brainstorming</li></ul>	CO3		
25.	Lattices & Algebraic Systems			<ul style="list-style-type: none"><li>• Lecture</li></ul>	CO3		
26.	Principle of Duality, Basic Properties			<ul style="list-style-type: none"><li>• Lecture</li></ul>	CO3		
27.	Sublattices, Distributed &Complemente dlattics			<ul style="list-style-type: none"><li>• Lecture</li></ul>	CO3		
28.		Doubt Class		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li><li>• Buzz Grouping</li></ul>	CO3		
29.		Discussed University		<ul style="list-style-type: none"><li>• Discussion</li><li>• Brainstorming</li></ul>	CO3		



		questions		• Buzz Grouping			
30.		Class test-3					
<b>Unit - 4</b>							
31.	Introduction to Derivative	Derivative of Single Variable Function, Partial Derivative of more than independent variable Functions		<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO4		
32.	Chain Rule			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO4		
33.	Change Of Variables			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO4		
34.	Extrema of Functions of 2 Variables			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO4		
35.	Euler's Theorem			<ul style="list-style-type: none"> <li>• Lecture</li> </ul>			
36.		Doubt Class		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO4		
37.		Discussed University questions		<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Brainstorming</li> <li>• Buzz Grouping</li> </ul>	CO4		
38.		Class Test-4					
<b>Unit - 5</b>							
39.	Introduction to Space			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
40.	Coordinates in Space, Direction Cosines			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
41.	Angle Between Two Lines, Projection of Join of Two Points on a Plane			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
42.	Equations of Plane, Straight Lines			<ul style="list-style-type: none"> <li>• Lecture</li> <li>• Brainstorming</li> </ul>	CO5		
43.	Conditions for a line to lie on a plane, Conditions for Two Lines to be Coplanar			<ul style="list-style-type: none"> <li>• Lecture</li> </ul>	CO5		



44.	Shortest Distance Between Two Lines, Equations of Sphere			<ul style="list-style-type: none"><li>Lecture</li></ul>	CO5		
45.	Tangent plane at a point on the sphere			<ul style="list-style-type: none"><li>Lecture</li></ul>	CO5		
46.		Doubt Class		<ul style="list-style-type: none"><li>Discussion</li><li>Brainstorming</li><li>Buzz Grouping</li></ul>	CO5		
47.		Discussed University questions		<ul style="list-style-type: none"><li>Discussion</li><li>Brainstorming</li><li>Buzz Grouping</li></ul>	CO5		
48.		Class Test-1					
<b>UNIT-6</b>							
49.	Introduction to Integration			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO6		
50.	Double Integral in Cartesian and Polar Coordinates to find Area			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO6		
51.	Change of Order of Integration			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO6		
52.	Solution by Undetermined Coefficients			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO6		
53.	Triple Integral			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO6		
54.	Find Volume of Simple Shapes in Cartesian Coordinates by Triple Integral			<ul style="list-style-type: none"><li>Lecture</li><li>Brainstorming</li></ul>	CO6		
55.		Doubt Class		<ul style="list-style-type: none"><li>Discussion</li><li>Brainstorming</li><li>Buzz Grouping</li></ul>	CO6		
56.		Discussed University questions		<ul style="list-style-type: none"><li>Discussion</li><li>Brainstorming</li><li>Buzz Grouping</li></ul>	CO6		
57.		Class Test-6					
<b>REVISION</b>							
58.		Revision of Unit-1			CO-1		



59.		Revision of Unit-2			CO-2		
60.		Revision of Unit-3			CO-3		
61.		Revision of Unit-4			CO-4		
62.		Revision of Unit-5			CO-5		
63.		Revision of Unit-6			CO-6		

**Text Books:** H.K DAS "Mathematics-3"

**Reference Books:** Application and Approximations of Multiple Integral: Sudhir R. Ghorpade, Balmohan

V. Limaye

Analytical Geometry : 2D And 3D by P R VITTAL, Pearson