



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Application

Choice Based Credit System (CBCS) in the light of NEP-2020

BCA (BDA-IBM)

SEMESTER-I (2026-29)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCDS201	Minor 2	Data Structure	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		13.5	9				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Allow to assess how the choice of data structures and algorithm design methods impacts the performance of programs.
2. To choose the appropriate data structure and algorithm design method for a specified application.
3. To solve problems using data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs and writing programs for these solutions.
4. To efficiently implement the different data structures and solutions for specific problems.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Analyse the concepts of algorithm evaluation and find time and space complexities for searching and sorting algorithms.
- CO2** Implement linear data structure such as stacks, queues, linked lists and their applications.
- CO3** Implement basic operations on binary trees.
- CO4** Demonstrate the representation and traversal techniques of graphs and their applications on data.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2** ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1** Quiz

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ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Root finding: Newton's Methods, Fixed point iteration, ill-behaved root finding problems.	12	ATL3 ATL6
II	Calculus of finite differences: Operators, forward difference operator, backward difference operator, E-operator, relation between them, difference of a polynomial, factorial polynomial, Inverse operator. forward difference table, Backward difference Table.	12	ATL3 ATL6
III	Interpolation Introduction to Interpolation; Interpolation with equally spaced interval, forward and backward interpolation formula, Interpolation with unequally spaced intervals, Newton divided difference interpolation, Langrange's formula for interpolation and inverse interpolation.	12	ATL3 ATL6
IV	Numerical differentiation and integration- Calculation of Derivative of first order by forward and backward interpolation formula. Trapezoidal and Simpson's Rules, one-third rule, three-eighth rule, Weddle's rule.	12	ATL3 ATL6
V	Solution of system of linear algebraic equations: Gaussian elimination with pivoting, Jacobian and Gauss Siedel iteration.	12	ATL3 ATL6
Total Hours		60	

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SUGGESTED READINGS:

Textbooks

1. Fundamental of Data Structures in C – 2ndEdition, Horowitz, Sahani, Anderson Freed, University Press
2. Tremblyand SORRENSON,“ Introduction to Data Structure with Applications”.
3. Tennenbaum A.M.,“ Data Structures using C & C++”; PHI
4. Yashwant Kanetkar, “Understanding Pointers in C”, BPB.

Suggested e- resources (Websites/e- books)

- 1 Data Structures and Algorithm Analysis in C – 2ndEdition, Mark Allen Weiss, Pearson
- 2 Classic Data Structures – 2nd Edition, Debasis Samantha, PHI

LIST OF PRACTICAL

	Title	CO Mapping
1.	Write a program to create a two dimensional array and perform add, subtract and multiplication operations.	CO4
2.	Write a program to create a two dimensional array using dynamic memory allocation.	CO4
3.	Write a program to implement stack.	CO4
4.	Write a program to convert infix expression into postfix expression.	CO4
5.	Write a program to check balanced parentheses for a given infix expression.	CO4
6.	Write a program to evaluate postfix expression.	CO4
7.	Write a program to implement queue.	CO4

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8.	Write a program to implement circular queue.	CO4
9.	Write a program to implement link list with insert, delete, search, view, and delete function.	CO5
10.	Write a program to implement ordered link list.	CO5
11.	Write a program to create doubly link list.	CO5
12.	Write a program to add two polynomials.	CO5
13.	Write a program to implement tree with insert, delete and search function.	CO5
14.	Write a program for in order, post order and preorder traversal of tree.	CO5
15.	Write a program for binary search and sequential search using recursion.	CO5
16.	Write a program for bubble sort and sequential search.	
17.	Write a program for insertion sort and quick sort.	CO5

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	3	2	-	-	-	-	-	-	2	1			
CO2	3	3	3	3	-	-	-	-	1	-	2	-			
CO3	3	3	3	3	-	-	-	-	1	-	2	-			
CO4	3	3	3	3	-	-	-	1	1	-	2	1			

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BCABDA201M	Major	Python Programming	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

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COURSE OBJECTIVES:

The student will have ability to:

1. The Python Training module will make the reader accustomed to python language.
2. This material will help the reader in understanding the basics of the python language, Python libraries and the use of python for the analytics.

COURSE ALIGNMENT WITH UNSDG:

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COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1 Able to install and get start python.
- CO2 Able to use data in python.
- CO3 Able to install Pandas and work with series and data frames
- CO4 Able to do the analysis.
- CO5 Able to apply advanced Machine learning algorithms

TEACHING PEDAGOGY:

- T1 Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
- T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- ATL1 Quiz

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ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to PYTHON :PYTHON OVERVIEW: Introduction to Python, its advantages and disadvantages, install and get start with python, basic variables and stings in python, Mathematical operators, functions.	12	ATL3 ATL5 ATL6
II	Core Programming in PYTHON How to input data in Python, Use Boolean with python, If and elif statement in python, while loop in python, Working with lists, For statement, Deal with Syntax errors, Deal with the exceptions, Work with regular expression, Work with Pattern matching, Parse data.	12	ATL3 ATL6
III	Data Analysis with Python Libraries Installing Pandas, Work with series and data frames, Work on grouping, aggregating and applying different functions on data, Merge and join the data.	12	ATL3 ATL6
IV	Regression and Visualization Define regression analysis, Work with regression analysis, Define exploratory analysis, Define correlation matrix, Perform visualization using matplotlib, Implement linear regression.	12	ATL3 ATL6
V	Advanced Topics in Python Apply advanced Machine learning algorithms, Work on Support vector machines, Define Random Forest.	12	ATL6
Total Hours		60	

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BCABDA201M	Major	Python Programming	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

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SUGGESTED READINGS:

Textbooks

- Pratiyush Guleria, "Basics of Python Programming, BPB Publications, March 2020.
- Jason Cannon "Python programming for beginners, Kindle book, 2020
- Ryan Turner, "Python Programming: 3 Books in 1: Ultimate Beginner's, Intermediate & Advanced Guide to Learn Python Step-by-Step", Kindle Edition, 2018.
- Martin Brown, "Python: The Complete Reference", Mc-Graw-Hill, 2018.

Suggested e- resources (Websites/e- books)

- https://cfm.ehu.es/ricardo/docs/python/Learning_Python.pdf
- <https://inventwithpython.com/>

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	3	1	1	-	-	-	-	-	-	2	-			
CO2	3	3	2	2	1	-	-	-	-	-	2	-			
CO3	3	3	2	2	3	-	-	-	-	-	2	-			
CO4	3	2	3	2	2	-	-	-	-	-	2	1			
CO5	3	3	3	3	1	-	1	-	-	1	3	2			

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA201M (P)	Major	Python Programming Lab	Max	0	0	0	30	20	0	0	4	2
			Min									

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3. The Python Training module will make the reader accustomed to python language.
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- CO2 Able to use data in python.
- CO3 Able to install Pandas and work with series and data frames
- CO4 Able to do the analysis.
- CO5 Able to apply advanced Machine learning algorithms

LIST OF PRACTICAL

	Title	CO Mapping
1.	Write a Python program to display “Hello Python” and print your name using variables.	CO4
2.	Write a Python program to perform basic mathematical operations: • Addition • Subtraction • Multiplication	CO4

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BCABDA201M (P)	Major	Python Programming Lab	Max	0	0	0	30	20	0	0	4	2
			Min									

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

	Division	
3.	Write a Python program to input two numbers from the user and find the largest number using if-elif-else statements.	CO4
4.	Write a Python program to check whether a given number is even or odd using Boolean conditions.	CO4
5.	Write a Python program to print numbers from 1 to 10 using a while loop .	CO4
6.	Write a Python program to create a list of 5 students and display all names using a for loop .	CO4
7.	Write a Python program to find the sum of all elements in a list.	CO4
8.	Write a Python program to handle division by zero exception using try-except.	CO4
9.	Write a Python program to check whether an email address is valid using regular expressions .	CO5
10.	1. Write a Python program to read a sentence and count: - Total words - Total vowels - Total spaces	CO5
11.	Write a Python program to create a Pandas Series from a list of numbers.	CO5
12.	Write a Python program to create a DataFrame containing student details (Name, Roll No, Marks) and display the first 3 records.	CO5
13.	11. Write a Python program to: - Group student data by department - Calculate average marks using Pandas groupby() function.	CO5
14.	14. Write a Python program to perform data visualization using Matplotlib: Draw a bar chart of student marks.	CO5

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BCABDA201M (P)	Major	Python Programming Lab	Max	0	0	0	30	20	0	0	4	2
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15.	Write a Python program to implement Linear Regression using Python libraries and predict house prices based on area values.	CO5
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CO4	3	2	3	2	2	-	-	-	-	-	2	1			
CO5	3	3	3	3	1	-	1	-	-	1	3	2			

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BCABDA203 M	Major 3	Agile Development and Scrum	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

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COURSE OBJECTIVES:

The student will have ability to:

This course offers an immersive introduction to Agile methodologies and Scrum practices, focusing on real-world application through hands-on labs and scenario-based learning.

1. Student will explore lean-inspired practices such as test-driven development, pair programming, and the use of Kanban boards.
Student will develop proficiency in crafting user stories, sprint planning, backlog refinement, and
2. collaborative team dynamics, all within a self-organizing environment guided by a Scrum Master.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Implement core Agile practices such as working in small batches, building a minimum viable product, pair programming, and applying behavior- and test-driven development.
- CO2** Master the sprint planning process, including the creation and refinement of a product backlog.
- CO3** Write clear and actionable user stories, estimate tasks using story points, and manage progress using Kanban boards.
- CO4** Develop and interpret burndown charts to forecast sprint outcomes, and use performance metrics to improve productivity, performance, and stakeholder satisfaction.

T1 Classroom teaching (white board), Power Point Presentations, Interactive

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA203 M	Major 3	Agile Development and Scrum	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

T2 lectures, Inquiry-based teaching
ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Agile and Scrum: Introduction to Agile Philosophy, Agile Principles, Methodologies Overview, Working Agile, Summary and Highlights, Practice Quiz, Scrum Overview, the 3 Roles of Scrum, Artifacts, Events, and Benefits, Summary and Highlights, Practice Quiz, Organizational Impact of Agile, Mistaking Iterative Development for Agile, Summary and Highlights, Practice Quiz, Graded Quiz, Discussion Prompt: Introduce Yourself.	12	ATL3 ATL6
II	Agile Roles and Planning Tools: Module Introduction and Learning Objectives, Destination Unknown, Agile Roles and the Need for Training, Kanban and Agile Planning Tools, Hands-on Lab: Get Set Up in GitHub, [Optional]	12	ATL3 ATL6

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA203 M	Major 3	Agile Development and Scrum	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

	Hands-on Lab: Get Set Up in ZenHub, Summary and Highlights, Practice Quiz.		
III	User Stories and Backlog Management: Creating Good User Stories, Hands-on Lab: Create an Issue Template in GitHub, Effectively Using Story Points, Building the Product Backlog, Assemble Your Product Backlog, Summary and Highlights, Practice Quiz, Backlog Refinement, Refine Your Product Backlog, Sprint Planning, Build a Sprint Plan from the Product Backlog, Summary and Highlights, Practice Quiz, Graded Quiz.	12	ATL3 ATL6
IV	Sprint Execution: Workflow for Daily Plan Execution, Move Stories from In Progress to Done, [Optional] Hands-on Lab: Move Stories from In Progress to Done using ZenHub, The Daily Stand Up, Summary and Highlights, Practice Quiz, Completing the Sprint, Using Burndown Charts, Setup a Burndown Chart for Your Plan, [Optional] Hands-on Lab: Setup a Burndown Chart for Your Plan using ZenHub, Summary and Highlights, Practice Quiz.	12	ATL3 ATL6
V	Sprint Review and Agile Improvement: The Sprint Review, The Sprint Retrospective, Using Measurements Effectively, Getting Ready for the Next Sprint, End of Sprint Activities, Agile Anti-Patterns and Health Check, Summary and Highlights, Practice Quiz, Graded Quiz, Final Graded Quiz.	12	ATL3 ATL6
	Total Hours	60	

SUGGESTED READINGS:

Textbooks

1. Kenneth S. Rubin, Essential Scrum: A Practical Guide to the Most Popular Agile Process, Addison-Wesley

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA203 M	Major 3	Agile Development and Scrum	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Professional / Pearson Education, 1st ed., 2012.

- Mike Cohn, Succeeding with Agile: Software Development Using Scrum, Addison-Wesley Professional, 1st ed., 2009.
- Jeff Sutherland, Scrum: The Art of Doing Twice the Work in Half the Time, Random House / Currency, 1st major ed. 2014/2015.

Reference Books

- Agile Software Development: Principles, Patterns, and Practices Robert C. Martin
- Agile Project Management with Scrum Ken Schwaber
- Scrum: The Art of Doing Twice the Work in Half the Time Jeff Sutherland

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	3	2	3	-	-	2	2	3	2	2	1			
CO2	1	2	2	2	-	-	3	2	3	2	2	1			
CO3	1	2	2	2	-	-	3	3	3	1	2	1			
CO4	1	2	3	2	-	-	3	2	2	2	2	2			

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA203M (P)	Major	Agile Development And Scrum Lab	Max	0	0	0	30	20	0	0	4	2
			Min									

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

This course offers an immersive introduction to Agile methodologies and Scrum practices, focusing on real-world application through hands-on labs and scenario-based learning.

1. Student will explore lean-inspired practices such as test-driven development, pair programming, and the use of Kanban boards.
2. Student will develop proficiency in crafting user stories, sprint planning, backlog refinement, and collaborative team dynamics, all within a self-organizing environment guided by a Scrum Master.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Implement core Agile practices such as working in small batches, building a minimum viable product, pair programming, and applying behaviour- and test-driven development.
- CO2** Master the sprint planning process, including the creation and refinement of a product backlog.
- CO3** Write clear and actionable user stories, estimate tasks using story points, and manage progress using Kanban boards.
- CO4** Develop and interpret burndown charts to forecast sprint outcomes, and use performance metrics to improve productivity, performance, and stakeholder satisfaction.

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA203M (P)	Major	Agile Development And Scrum Lab	Max	0	0	0	30	20	0	0	4	2
			Min									

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

		Mapping
1.	Prepare a document describing each Agile principle with an example.	CO1
2.	Create a table showing the responsibilities of the Scrum Master, Product Owner, and Development Team.	CO2
3.	Prepare a chart showing Product Backlog, Sprint Backlog, and Increment with their purposes.	CO4
4.	Create a comparison table with at least five differences.	CO4
5.	Create a new repository and upload a README file describing a sample project.	CO4
6.	Design a simple Kanban board with columns: To Do, In Progress, and Done.	CO4
7.	Create at least five user stories using the format: • "As a ___, I want ___, so that ___."	CO4
8.	Assign story points to the user stories created in Question 7 using the Fibonacci sequence.	CO4
9.	Prepare a prioritized product backlog for a Library Management System.	CO3
10.	Refine the backlog created in Question 9 by adding priority and acceptance criteria.	CO4
11.	Select backlog items and create a Sprint Backlog for a two-week sprint.	CO4
12.	Record answers to the following: • What did you do yesterday? • What will you do today? • Are there any blockers?	CO4
13.	Move sample tasks from "To Do" to "In Progress" and then to "Done" using a Kanban board.	CO3
14.	Prepare a simple burndown chart for a 10-day sprint using sample data.	CO3
15.	Prepare a report including:	CO4

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA203M (P)	Major	Agile Development And Scrum Lab	Max	0	0	0	30	20	0	0	4	2
			Min									

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

	- Completed work - Pending work - What went well - Areas for improvement	
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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	3	2	3	-	-	2	2	3	2	2	1			
CO2	1	2	2	2	-	-	3	2	3	2	2	1			
CO3	1	2	2	2	-	-	3	3	3	1	2	1			
CO4	1	2	3	2	-	-	3	2	2	2	2	2			

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCABDA201M	Major	Python Programming	Max	60	20	20	0	0	4	0	0	4
			Min	24	16							

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