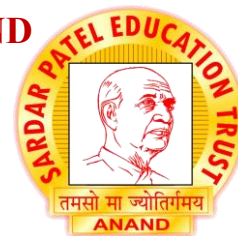




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Revised Syllabus as per NEP 2020 with effect from the Academic Year 2026-2027

Master of Science (Data Science)
Semester – I

Course Code	PGN1CMDS02	Title of the Course	Data Structures
Total Credits	02 Credits	Hours per Week	02 Hours / Week

Course Learning Outcomes (CLOs)

CLO 1	Understand basic data structures and complexity analysis. Students will be able to explain fundamental concepts such as arrays, linked lists, stacks, queues, and analyze algorithm efficiency using Big-O notation.
CLO 2	Apply advanced data structures such as trees, graphs, hashing, and heaps to solve computational problems. Students will be able to design and implement solutions using binary trees, binary search trees, graph traversal techniques (BFS and DFS), hash tables, and priority queues.

Course Content

Unit No.	Description	Weightage (%)
1.	Linear Data Structures • Introduction to Data Structures • Algorithm Analysis and Big O Notation • Arrays • Linked Lists • Stacks • Queues • Applications of Linear Data Structures	50%
2.	Non-Linear Data Structures • Trees and binary search trees • Tree traversals • Graphs (BFS and DFS) • Hashing • Heaps and priority queues • Applications of non-linear data structures	50%

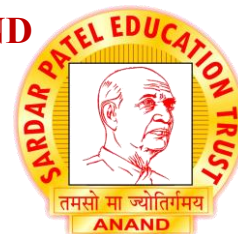
Teaching – Learning Methodology

The course would be taught /learnt through ICT (e.g. Power Point Presentation, Audio-Visual Presentation), Lectures, Group Discussions, Group Activities, Quizzes, Assignments, Case Study and Browsing E- Resources.



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Examination Evaluation Pattern		
Sr. No.	Particulars	Weightage (%)
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	50%
02	Semester End Evaluation (SEE) (Summative Assessment)	50%
	TOTAL	100%

Specifications for CCE and SEE		
Sr. No.	Details of the Evaluation Pattern	Marks
01	Continuous and Comprehensive Evaluation (CCE) (Formative Assessment)	
	A Assignments	10
	B Active Learning Activities	05
	C Attendance	05
	D Written Examination (01 Hour)	30
	(A + B + C + D)	50 Marks
	Note: • For 02 Credit Courses, the Formative Assessment for students must be from 25 Marks. Thus, the total obtained marks from A + B + C + D (50 Marks) will be divided by 02.	25 Marks
02	Semester End Evaluation (SEE) (Summative Assessment)	
	E Written Examination (01 Hour)	25 Marks
	TOTAL (For 02 Credit Courses)	50 Marks

Rubrics – Based Assessment for Assignments (10 Marks)		
Excellent	09 – 10 Marks	Accurate, error-free, logically presented, timely submission
Good	07 – 08 Marks	minor errors and good conceptual clarity
Average	05 – 06 Marks	basic understanding or partially correct
Basic	03 – 04 Marks	limited clarity, noticeable mistakes, incomplete content
Poor	01 – 02 Marks	Inadequate conceptual clarity, incorrect content
Below Poor	Zero Marks / NA	content is irrelevant / Not Attempted / Not Submitted
Note: • Assignments may be taken in forms of written project, computerized and online suggested courses / certificates as per the decision made by the respective faculties of the courses.		

Rubrics – Based Assessment for Multiple Choice Questions (05 Marks)		
05 Multiple Choice Questions – 01 Mark Each (05 Marks)		
Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	Chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted

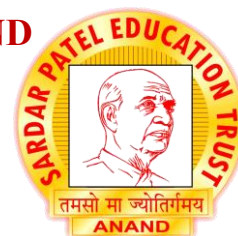
Rubrics – Based Assessment for Attendance (05 Marks)
As per the Rules and Regulations provided by the Academic Section of Sardar Patel University, Vallabh Vidyanagar, for the students studying in all departments and colleges. Reference No.: E – 3 / 3127; dated: 07-03-2024.



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<https://www.spuvvn.edu/orbit-cdn/uploads/circulars/Circular-NEP-InternalExamMarks-March-April24.pdf>

Excellent	05 Marks	more than 90% (Minimum 27 Hours for 02 Credits Courses)
Good	04 Marks	80% - 89% (24 to 26 Hours for 02 Credit Courses)
Average	03 Marks	70% - 79% (21 to 23 Hours for 02 Credit Courses)
Poor	Zero / NA	less than 70% (NOT ELIGIBLE TO APPEAR FOR EXAM)

Note:

- Students with below 70% of attendance must submit their written application to their respective class coordinators with genuine reasons and evidence (in case of working or medical emergencies). Students must not pursue dual degree programmes that clash with the college's timings.

Rubrics – Based Assessment for Mid-Semester Examination (30 Marks)

ANY ONE UNIT OR 50% OF THE SYLLABUS - 15 Marks Each Question

Excellent	13 – 15 Marks	Demonstrates comprehensive understanding, accurate concepts, logical presentation, and appropriate examples/solutions.
Good	10 – 12 Marks	Shows good understanding with minor errors; answers are mostly complete and well-organized.
Average	07 – 09 Marks	Demonstrates satisfactory understanding with some conceptual gaps and limited explanation.
Basic	04 – 06 Marks	Shows partial understanding; answer is incomplete with several errors.
Poor	01 – 03 Marks	Demonstrates minimal understanding; major conceptual errors and inadequate response.
Below Poor	Zero Marks / NA	Irrelevant content or not attempted.

Note:

- Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.

Rubrics – Based Evaluation Pattern for End-Semester Examination (25 Marks)

Multiple Choice Questions (05 Marks) – 01 Mark Each from all Units

Excellent	01 Mark	The chosen option is correct, no errors in response
Below Poor	Zero Marks / NA	Chosen option is incorrect, completely irrelevant, multiple options chosen / Not Attempted

Short Question (08 Marks) – 4 Question from all Units

Excellent	02 Marks	Complete, accurate, and well-presented answer.
Good	01 Mark	Partially correct; demonstrates basic understanding.
Poor	00 Mark	Incorrect, irrelevant, or no response provided.

UNIT I - 06 Marks Each Question

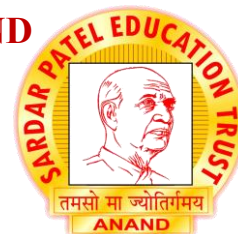
Excellent	05 – 06 Marks	Clear understanding of basic data structures and algorithm
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		complexity with correct explanation and examples.
Good	04 – 05 Marks	Good understanding with minor mistakes or missing points.
Average	03 – 04 Marks	Basic understanding with incomplete explanation.
Basic	02 – 03 Marks	Partial answer with limited correctness.
Poor	01 – 02 Marks	Very limited understanding; mostly incorrect.
Below Poor	Zero Marks / NA	Irrelevant content or not attempted.

UNIT II - 6 Marks Each Question

Excellent	05 – 06 Marks	Clear understanding of trees, graphs, hashing, and related concepts with correct logic and examples.
Good	04 – 05 Marks	Good knowledge with minor errors or missing details.
Average	03 – 04 Marks	Satisfactory understanding but incomplete explanation.
Basic	02 – 03 Marks	Partial knowledge with several mistakes.
Poor	01 – 02 Marks	Very weak understanding; mostly incorrect.
Below Poor	Zero Marks / NA	Irrelevant content or not attempted.

Note:

- Multiple Choice Questions of 5 Marks will be based on various levels of Revised Bloom's Taxonomy.
- Written Examination questions will be based on various levels of Revised Bloom's Taxonomy.

PLO – CLO Mapping

	Data Structures					
	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CLO 1	03	02	01	01	01	01
CLO 2	02	03	03	02	01	02

Note:

- High: **03**; Moderate: **02**; Low: **01**; No Mapping: **00**

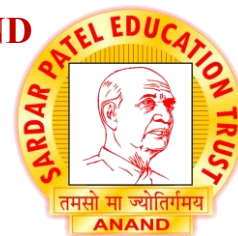
Suggested References and E-Resources for Further Reading

• Data Structures and Algorithm Analysis in C++ – Mark Allen Weiss.
• Introduction to Algorithms – Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein.
• Data Structures Using C – Reema Thareja.
• Data Structure's & Algorithms with python Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser
• Problem Solving with Algorithms and Data Structures Release 3.0 Brad Miller, David Ranum



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|---|
| <ul style="list-style-type: none">• Data Structures & Algorithms in Python John Canning Alan Broder Robert Lafore |
| <ul style="list-style-type: none">• https://jovian.com/learn/data-structures-and-algorithms-in-python |
| <ul style="list-style-type: none">• https://www.geeksforgeeks.org/python-data-structures-and-algorithms/ |
