

Maharashtra State Board of Technical Education, Mumbai
Laboratory Plan (LP-PR)/ Course Information Sheet (CIS)

K-2A

Academic Year: 2026-27

Date: 01/07/2026

Institute Name: K. K. Wagh Polytechnic, Nashik

MSBTE Code: 0078

Program and Code: Computer Technology (CM)

Course Code & Abbr.: 313301 (DSU)

Course Name: DATA STRUCTURE USING C (DSU)

Name of Faculty: Mr.S.K.Mahajan

Class: SYCM-Win **Semester:** 3rd **Scheme:** K

Course Index: CI:301 **Learning Hrs:**45

● **Teaching-Learning & Assessment Scheme:**

Title	Course Code / Abbr	Course Category	Learning Scheme						Credits	TH Paper Duration (Hrs.)	Assessment Scheme									
			Actual Contact Hrs/Week			SLH	NLH	Theory				Based on LL & TSL Practical				Based on SL		Total Marks		
			CL	TL	LL			FA TH			SA TH	Total		FA-PR		SA-PR			SLA	
												Max	Max	Max	Min	Max	Min		Max	Min
DATA STRUCTURE USING C	313301/ DSU	DSC	3	1	4	-	8	4	3	30	70	100	40	50	20	25#	10	-	-	175

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment
Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

● **Course Outcomes (COs): Theory & Practical**

By learning course Data Structure in C (DSU-313301) Second Year students will be able to:

CO No.	Course Outcomes (COs) / Unit Outcomes (UOs)
CO301.1(CO1)	Perform basic operations on Arrays.
CO301.2(CO2)	Apply different Searching and Sorting methods.
CO301.3(CO3)	Implement basic operations on Linked List.
CO301.4(CO4)	Perform operations on Stack using Array and Linked List Implementations.
CO301.5(CO5)	Perform operations on Queue using Array and Linked List Implementations.
CO301.6(CO6)	Create and Traverse Tree to solve problems.

● **COs, Practical Laboratory Learning Outcome (LLOs) and Mapping:**

Pr. No	COs	LLO	Practical -Laboratory Learning Outcome (LLO)
PR 1	CO301.1 (CO1)	LLO 1.1	Implement Array Operations.
PR 2	CO301.2 (CO2)	LLO 2.1	Implement Linear Search Method on Numbers.
PR 3	CO301.3 (CO2)	LLO 3.1	Implement Linear Search Method on Strings
PR 4	CO301.3 (CO2)	LLO 4.1	Implement Binary Search Method on Numbers.
PR 5	CO301.3 (CO2)	LLO 5.1	Implement Binary Search Method on Strings.
PR 6	CO301.3 (CO2)	LLO 6.1	Apply Bubble Sort method for Sorting Numbers.
PR 7	CO301.3 (CO2)	LLO 7.1	Apply Bubble Sort method for Sorting Strings.
PR 8	CO301.3 (CO2)	LLO 8.1	Apply Selection Sort for Sorting Numbers.
PR 9	CO301.3 (CO2)	LLO 9.1	Apply Selection Sort for Sorting Strings.
PR 10	CO301.3 (CO2)	LLO 10.1	Apply Insertion Sort for Sorting Numbers.
PR 11	CO301.3 (CO2)	LLO 11.1	Apply Insertion Sort for Sorting Strings.
PR 12	CO301.3 (CO3)	LLO 12.1	Create Singly Linked List.
PR 13	CO301.3 (CO3)	LLO 13.1	Perform given Operations on Singly Linked List.
PR 14	CO301.3 (CO3)	LLO 14.1	Create Polynomials using Linked List.
PR 15	CO301.3 (CO3)	LLO 15.1	Perform the Addition of Two Polynomials using a Linked List.
PR 16	CO301.3 (CO4)	LLO 16.1	Perform Operations on the Stack using the Array.
PR 17	CO301.3 (CO4)	LLO 17.1	Perform Operations on the Stack using a Linked List.
PR 18	CO301.4 (CO4)	LLO 18.1	Apply recursive procedure to multiply two numbers.

PR 19	CO301.4 (CO4)	LLO 19.1	Apply recursive procedure to reverse the string.
PR 20	CO301.4 (CO4)	LLO 20.1	Apply recursive procedure to display linked list in reverse.
PR 21	CO301.4 (CO5)	LLO 21.1	Perform Operations on Linear Queue using Array.
PR 22	CO301.4 (CO5)	LLO 22.1	Perform Operations on Linear Queue using Linked List.
PR 23	CO301.4 (CO5)	LLO 23.1	Perform Operations on Circular Queue using Array.
PR 24	CO301.4 (CO5)	LLO 24.1	Perform Operations on Circular Queue using a Linked List.
PR 25	CO301.4 (CO5)	LLO 25.1	Implement Priority Queue using Linked List.
PR 26	CO301.4 (CO6)	LLO 26.1	Implement Binary Search Tree and perform In-Order Traversal.
PR 27	CO301.5 (CO6)	LLO 27.1	Implement Tree Traversal Operations.

LLOs		COs	POs							PSOs	
			PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO1	PSO2
Implement Array Operations.	LLO 1.1	CO301.1 (CO1)	3	2	–	–	2	–	–	3	1
Implement Linear Search Method on Numbers.	LLO 2.1	CO301.2 (CO2)	3	3	–	–	2	–	–	3	1
Implement Linear Search Method on Strings	LLO 3.1	CO301.3 (CO2)	3	3	–	–	2	–	–	3	1
Implement Binary Search Method on Numbers.	LLO 4.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Implement Binary Search Method on Strings.	LLO 5.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Apply Bubble Sort method for Sorting Numbers.	LLO 6.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Apply Bubble Sort method for Sorting Strings.	LLO 7.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Apply Selection Sort for Sorting Numbers.	LLO 8.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Apply Selection Sort for Sorting Strings.	LLO 9.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Apply Insertion Sort for Sorting Numbers.	LLO 10.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Apply Insertion Sort for Sorting Strings.	LLO 11.1	CO301.3 (CO2)	3	3	1	–	2	–	–	3	1
Create Singly Linked List.	LLO 12.1	CO301.3 (CO3)	3	3	2	–	2	–	–	3	2
Perform given Operations on Singly Linked List.	LLO 13.1	CO301.3 (CO3)	3	3	2	–	2	–	–	3	2
Create Polynomials using Linked List.	LLO 14.1	CO301.3 (CO3)	3	3	2	–	2	–	–	3	2
Perform the Addition of Two Polynomials using a Linked List.	LLO 15.1	CO301.3 (CO3)	3	3	3	–	2	–	–	3	2
Perform Operations on the Stack using the Array.	LLO 16.1	CO301.3 (CO4)	3	3	2	–	2	–	–	3	2
Perform Operations on the Stack using a Linked List.	LLO 17.1	CO301.3 (CO4)	3	3	2	–	2	–	–	3	2
Apply recursive procedure to multiply two numbers.	LLO 18.1	CO301.4 (CO4)	3	3	2	–	2	–	–	3	2
Apply recursive procedure to reverse the string.	LLO 19.1	CO301.4 (CO4)	3	3	2	–	2	–	–	3	2

LLOs		COs	POs							PSOs	
			PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PSO1	PSO2
Apply recursive procedure to display linked list in reverse.	LLO 20.1	CO301.4 (CO4)	3	3	2	–	2	–	–	3	2
Perform Operations on Linear Queue using Array.	LLO 21.1	CO301.4 (CO5)	3	3	2	–	2	–	–	3	2
Perform Operations on Linear Queue using Linked List.	LLO 22.1	CO301.4 (CO5)	3	3	2	–	2	–	–	3	2
Perform Operations on Circular Queue using Array. defined exceptions)	LLO 23.1	CO301.4 (CO5)	3	3	3	–	2	–	–	3	2
Perform Operations on Circular Queue using a Linked List. procedures for modularity	LLO 24.1	CO301.4 (CO5)	3	3	3	–	2	–	–	3	2
Implement Priority Queue using Linked List.	LLO 25.1	CO301.4 (CO5)	3	3	3	–	2	–	–	3	2
Implement Binary Search Tree and perform In-Order Traversal.	LLO 26.1	CO301.4 (CO6)	3	3	3	1	2	–	–	3	3
Implement Tree Traversal Operations.	LLO 27.1	CO301.5 (CO6)	3	3	3	1	2	–	–	3	3

• **Practical Plan:**

Sr No	COs and LLOs	Practical Titles	Planned Dates		Remark & Faculty Sign with Assessment Date
			From	To	
1	CO1 LLO 1.1	* Write a 'C' program to perform following Operations on Array: Create, Insert, Delete, Display.	A-02/07/2026 B-03/07/2026 C-04/07/2026	A-06/07/2026 B-07/07/2026 C-08/07/2026	
2	CO2 LLO 1.3	Write a 'C' Program to Search a particular data from the given Array of numbers using: Linear Search Method.	A-06/07/2026 B-07/07/2026 C-08/07/2026	A-09/07/2026 B-10/07/2026 C-11/07/2026	
3	CO2 LLO 1.3	* Write a 'C' Program to Search a particular data from the given Array of Strings using Linear Search Method..	A-09/07/2026 B-10/07/2026 C-11/07/2026	A-13/07/2026 B-14/07/2026 C-15/07/2026	
4	CO2 LLO 1.3	. * Write a 'C' program to Search a particular data from the given Array of numbers using Binary Search Method.	A-13/07/2026 B-14/07/2026 C-15/07/2026	A-16/07/2026 B-17/07/2026 C-18/07/2026	
5	CO2 LLO 1.3	Write a 'C' Program to Search a particular data from the given Array of Strings using Binary Search Method.	A-16/07/2026 B-17/07/2026 C-18/07/2026	A-20/07/2026 B-21/07/2026 C-22/07/2026	
6	CO2 LLO 1.3	* Write a 'C' Program to Sort an Array of numbers using Bubble Sort Method.	A-20/07/2026 B-21/07/2026 C-22/07/2026	A-23/07/2026 B-24/07/2026 C-25/07/2026	
7	CO2 LLO 1.3	Write a 'C' Program to Sort an Array of Strings using Bubble Sort Method.	A-23/07/2026 B-24/07/2026 C-25/07/2026	A-27/07/2026 B-28/07/2026 C-29/07/2026	
8	CO2 LLO 1.3	* Write a 'C' Program to Sort an Array of numbers using Selection Sort Method.	A-27/07/2026 B-28/07/2026 C-29/07/2026	A-30/07/2026 B-31/07/2026 C-01/08/2026	

Sr No	COs and LLOs	Practical Titles	Planned Dates		Remark & Faculty Sign with Assessment Date
			From	To	
9	CO2 LLO 1.3	Write a 'C' Program to Sort an Array of Strings using Selection Sort Method.	A-30/07/2026 B-31/07/2026 C-01/08/2026	A-03/08/2026 B-04/08/2026 C-05/08/2026	
10	CO2 LLO 1.3	* Write a 'C' Program to Sort an Array of numbers using Insertion Sort Method.	A-03/08/2026 B-04/08/2026 C-05/08/2026	A-06/08/2026 B-07/08/2026 C-08/08/2026	
11	CO2 LLO 1.3	Write a 'C' Program to Sort an Array of Strings using Insertion Sort Method.	A-06/08/2026 B-07/08/2026 C-08/08/2026	A-17/08/2026 B-18/08/2026 C-19/08/2026	
12	CO3 LLO 1.3	* Write a 'C' Program to Implement Singly Linked List with Operations: (i) Insert at beginning, (ii) Search, (iii) Display	A-17/08/2026 B-18/08/2026 C-19/08/2026	A-20/08/2026 B-21/08/2026 C-22/08/2026	
13	CO3 LLO 1.3	* Write a C Program to Implement Singly Linked List with Operations: (i) Insert at end, (ii) Insert After, (iii) Delete (iv) Display	A-20/08/2026 B-21/08/2026 C-22/08/2026	A-27/08/2026 B-28/08/2026 C-29/08/2026	
14	CO3 LLO 1.3	Write a C Program to Create Two Polynomials using a Linked List.	A-27/08/2026 B-28/08/2026 C-29/08/2026	A-31/08/2026 B-01/09/2026 C-02/09/2026	
15	CO3 LLO 1.3	* Write a 'C' Program to add Two Polynomials using a Linked List.	A-31/08/2026 B-01/09/2026 C-02/09/2026	A-03/09/2026 B-04/09/2026 C-05/09/2026	
16	CO4 LLO 1.3	* Write a 'C' Program to perform PUSH and POP Operations on Stack using an Array.	A-03/09/2026 B-04/09/2026 C-05/09/2026	A-07/09/2026 B-08/09/2026 C-09/09/2026	
17	CO4 LLO 1.3	* Write a 'C' Program to perform PUSH and POP Operations on a Stack using a Linked List.	A-07/09/2026 B-08/09/2026 C-09/09/2026	A-10/09/2026 B-11/09/2026 C-12/09/2026	
18	CO4 LLO 1.4	* Write a 'C' program to perform multiplication of two numbers using recursion.	A-10/09/2026 B-11/09/2026 C-12/09/2026	A-14/09/2026 B-15/09/2026 C-16/09/2026	
19	CO4 LLO 1.4	Write a 'C' program to print given string in reverse using recursion.	A-14/09/2026 B-15/09/2026 C-16/09/2026	A-17/09/2026 B-18/09/2026 C-19/09/2026	
20	CO4 LLO 1.4	Write a 'C' program to create a Singly Linked List and traverse in reverse order using recursion.	A-17/09/2026 B-18/09/2026 C-19/09/2026	A-21/09/2026 B-22/09/2026 C-23/09/2026	
21	CO5 LLO 1.4	* Write a 'C' Program to perform INSERT and DELETE Operations on Linear Queue using an Array.	A-21/09/2026 B-22/09/2026 C-23/09/2026	A-24/09/2026 B-25/09/2026 C-26/09/2026	
22	CO5 LLO 1.4	* Write a 'C' Program to perform INSERT and DELETE operations on Linear Queue using a Linked List.	A-24/09/2026 B-25/09/2026 C-26/09/2026	A-28/09/2026 B-29/09/2026 C-30/09/2026	
23	CO5 LLO 1.4	* Write a 'C' Program to perform INSERT and DELETE operations on Circular Queue using an Array.	A-28/09/2026 B-29/09/2026 C-30/09/2026	A-01/10/2026 B-06/10/2026 C-03/10/2026	
24	CO5 LLO 1.4	Write a 'C' Program to perform INSERT and DELETE operations on Circular Queue using a Linked List.	A-01/10/2026 B-06/10/2026 C-03/10/2026	A-04/10/2026 B-05/10/2026 C-06/10/2026	
25	CO5 LLO 1.4	Write a 'C' Program to Create a Priority Queue using a Linked List.	A-04/10/2026 B-05/10/2026 C-06/10/2026	A-08/10/2026 B-09/10/2026 C-10/10/2026	

Sr No	COs and LLOs	Practical Titles	Planned Dates		Remark & Faculty Sign with Assessment Date
			From	To	
26	CO6 LLO 1.4	* Write a 'C' Program to Implement BST (Binary Search Tree) and Traverse in In-Order.	A-08/10/2026 B-09/10/2026 C-10/10/2026	A-08/10/2026 B-09/10/2026 C-10/10/2026	
27	CO6 LLO 1.5	Write a 'C' Program to Traverse BST in Preorder, and Post-Order.	A-08/10/2026 B-09/10/2026 C-10/10/2026	A-08/10/2026 B-09/10/2026 C-10/10/2026	

• Formative & Summative Assessment Criteria:

• Theory Assessment:

a) Formative assessment (TH-FA) :

Two offline class tests each of 30 marks will be conducted as per MSBTE guidelines. The average of two class test marks will be considered for final TH-FA (Average) out of 30 marks.

b) Summative Assessment (TH- SA) :

The comprehensive End semester assessment will be done by MSBTE by a Theory written Examination for 70 marks. Question Paper and Assessment is performed by MSBTE. Final Theory Score out of 100 Marks will be derived as the total score as below: TH-SA [out of 70] + TH-FA [Average out of 30] =100 Marks

• Practical Assessment:

- Formative Assessment (FA) of each practical/experiment will be performed progressively for 50 marks. The assessment will be performed based on the Regularity in Practical Performance, Tool Selection Ability, Use of Appropriate tool to perform the Identified tasks, Algorithm/Solution developed, Quality of output achieved, Answer to sample questions and Submit report in total time.
- Final Term Work(FA-PR) of 50 marks is calculated based on scores in Formative Assessment for all practical's/experiments as:
Term Work Marks = Sum of Total Marks Scored in FA / (50 x Total Number of Experiments)
- A Summative (comprehensive) Assessment (SA-PR) of Practical will be performed as End Semester Examination (ESE). The SA-PR will be before 25 Marks with MSBTE guidelines at the end of semester. The schedule of MSBTE Practical ESE will be display on Notice board prior to examination.

• Practical

1. Suggested Books for Reference:

Sr. No	Title of the Book	Author	Publication
1.	Data Structure Using C	ISRD Group New Dehli	Tata McGraw-Hill
2.	Data Structure Using C	Reema Thareja	OXFORD University Press
3.	Introduction to data structures in C	Ashok Kamthane	Pearson
4.	C & Data Structures	Prof. P.S. Deshpande, Prof D.G. kakde	Dream Tech press
5.	Data structures Algorithms Using C	Amitava Nag & Jyoti Prakash Singh	Vikas
6.	Data Structures with 'C' (SIE)	Lipschutz	McGraw Hill Education, New Delhi ISBN:978-0070701984
7.	Data Structures using 'C'	Balgurusamy , E.	McGraw Hill Education, New Delhi 2013,ISBN: 978-1259029547
8.	Understanding Pointers in C	Yashwant Kanetkar	BPB ISBN 8170298911

2. Learning Websites & Portal

Sr. No	URL	Description
1	https://www .javatpoint.com/data-structure-introduction	For All Contents
2	https://www .geeksforgeeks.org/introduction-to-data-structures/	For All Contents
3	https://studytomight.com/data-structures/	For All Contents
4	https://www.tutorialspoint.com/data_structures_algorithms/	For All Contents
5	https://www .w3schools.in/data-structures/	For All Contents
6	https://www .mygreatlearning.com/blog/data-structure-tutorial-for-beginners/	For All Contents
7	https://byjus.com/gate/introduction-to-data-structure-notes/	For All Contents

3. Video reference URL

Sr. No	URL	Description
1	https://youtu.be/C46QfTjVCNU	Linear Search
2	https://youtu.be/V_T5NuccwRA	Binary Search Algorithm with example
3	https://youtu.be/o4bAoo_gFBU	Bubble Sort Algorithm
4	https://youtu.be/bxRVz8zkIWM	Stack in Data Structure
5	https://youtu.be/PAceaOSnxQs	Infix to Postfix using Stack
6	https://youtu.be/ygK0YON10sQ	Recursion and Stack
7	https://youtu.be/dq3F3e9o2DM	Insertion of a Node in Linked List(at Beginning, End, Specified Position)with Code
8	https://youtu.be/v4szCPs9yEY	Insertion in Doubly Linked List(beginning, end, specific position)
9	https://youtu.be/fmfx1C4TTxw	Circular Linked List in Data Structure
10	https://youtu.be/ReGglEXEH08	Insertion in Circular Linked List
11	https://youtu.be/EkE6RHuMx3I	Deletion of a Node from Circular Linked List(beginning, end, given position)
12	https://youtu.be/-b2lciNd2L4	Binary Tree Traversals (Inorder, Preorder and Postorder) Data structures and algorithms
13	https://youtu.be/cySVml6e_Fc	Binary Search Trees (BST) - Insertion and Deletion
14	https://youtu.be/vf-cxgUXcMk	BFS and DFS Graph Traversals
15	https://youtu.be/84BsI5VJPq4	Evaluation of Postfix Expression
16	https://youtu.be/op_NxwPY61I	Evaluation of Prefix expression
17	https://youtu.be/ygK0YON10sQ	Recursion and Stack
18	https://youtu.be/v9BMdz5m5Vo	Linear Queue Implementation - Array

3. Tools to Use for Teaching-Learning, Assessment and Evaluation:

- **Turbo C** – *To write and execute C program as well as to debug the C program.*
- **Google Classroom** – *To share E-materials and all the required documents for preparing assignments and self-learning activities.*

Mr.S.K.Mahajan
(Name & signature of staff)

Prof. M.P.Bhosale
(Name & signature of HOD)

CC-

- DSU-313301 Course File
- Notice Board / ERP
- Institute Website / CIAAN Coordinator

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PR 24	CO301.4 (CO5)	LLO 24.1	Perform Operations on Circular Queue using a Linked List.
PR 25	CO301.4 (CO5)	LLO 25.1	Implement Priority Queue using Linked List.
PR 26	CO301.4 (CO6)	LLO 26.1	Implement Binary Search Tree and perform In-Order Traversal.
PR 27	CO301.5 (CO6)	LLO 27.1	Implement Tree Traversal Operations.

• **Practical Plan:**

Sr No	COs and LLOs	Tutorial Titles	Planned Dates		Remark & Faculty Sign with Assessment Date
			From	To	
1	CO1 LLO 1.1	Implement Array Operations.	03/07/2026	03/07/2026	
2	CO2 LLO 1.3	Implement Linear Search Method on Numbers.	03/07/2026	07/07/2026	
3	CO2 LLO 1.3	Implement Linear Search Method on Strings	07/07/2026	10/07/2026	
4	CO2 LLO 1.3	Implement Binary Search Method on Numbers.	10/07/2026	10/07/2026	
5	CO2 LLO 1.3	Implement Binary Search Method on Strings.	10/07/2026	17/07/2026	
6	CO2 LLO 1.3	Apply Bubble Sort method for Sorting Numbers.	17/07/2026	17/07/2026	
7	CO2 LLO 1.3	Apply Bubble Sort method for Sorting Strings.	17/07/2026	24/07/2026	
8	CO2 LLO 1.3	Apply Selection Sort for Sorting Numbers.	24/07/2026	31/07/2026	
9	CO2 LLO 1.3	Apply Selection Sort for Sorting Strings.	31/07/2026	07/08/2026	
10	CO2 LLO 1.3	Apply Insertion Sort for Sorting Numbers.	07/08/2026	07/08/2026	
11	CO2 LLO 1.3	Apply Insertion Sort for Sorting Strings.	07/08/2026	14/08/2026	
12	CO3 LLO 1.3	Create Singly Linked List.	14/08/2026	14/08/2026	
13	CO3 LLO 1.3	Perform given Operations on Singly Linked List.	14/08/2026	21/08/2026	
14	CO3 LLO 1.3	Create Polynomials using Linked List.	21/08/2026	21/08/2026	
15	CO3 LLO 1.3	Perform the Addition of Two Polynomials using a Linked List.	21/08/2026	28/08/2026	

Sr No	COs and LLOs	Tutorial Titles	Planned Dates		Remark & Faculty Sign with Assessment Date
			From	To	
16	CO4 LLO 1.3	Perform Operations on the Stack using the Array.	28/08/2026	28/08/2026	
17	CO4 LLO 1.3	Perform Operations on the Stack using a Linked List.	28/08/2026	04/09/2026	
18	CO4 LLO 1.4	Apply recursive procedure to multiply two numbers.	04/09/2026	04/09/2026	
19	CO4 LLO 1.4	Apply recursive procedure to reverse the string.	04/09/2026	11/09/2026	
20	CO4 LLO 1.4	Apply recursive procedure to display linked list in reverse.	11/09/2026	11/09/2026	
21	CO5 LLO 1.4	Perform Operations on Linear Queue using Array.	11/09/2026	18/09/2026	
22	CO5 LLO 1.4	Perform Operations on Linear Queue using Linked List.	18/09/2026	18/09/2026	
23	CO5 LLO 1.4	Perform Operations on Circular Queue using Array. (defined exceptions)	18/09/2026	25/09/2026	
24	CO5 LLO 1.4	Perform Operations on Circular Queue using a Linked List. procedures for modularity	25/09/2026	25/09/2026	
25	CO5 LLO 1.4	Implement Priority Queue using Linked List.	25/09/2026	09/10/2026	
26	CO6 LLO 1.4	Implement Binary Search Tree and perform In-Order Traversal.	09/10/2026	09/10/2026	
27	CO6 LLO 1.5	Implement Tree Traversal Operations.	09/10/2026	03/07/2026	

- **Formative & Summative Assessment Criteria:**

- **Theory Assessment:**

- a) **Formative assessment (TH-FA) :**

Two offline class tests each of 30 marks will be conducted as per MSBTE guidelines. The average of two class test marks will be considered for final TH-FA (Average) out of 30 marks.

- b) **Summative Assessment (TH- SA) :**

The comprehensive End semester assessment will be done by MSBTE by a Theory written Examination for 70 marks. Question Paper and Assessment is performed by MSBTE. Final Theory Score out of 100 Marks will be derived as the total score as below: TH-SA [out of 70] + TH-FA [Average out of 30] =100 Marks

- **Practical Assessment:**

1. Formative Assessment (FA) of each practical/experiment will be performed progressively for 50 marks. The assessment will be performed based on the Regularity in Practical Performance, Tool Selection Ability, Use of Appropriate tool to perform the Identified tasks, Algorithm/Solution developed, Quality of output achieved, Answer to sample questions and Submit report in total time.
2. Final Term Work(FA-PR) of 50 marks is calculated based on scores in Formative Assessment for all practical's/experiments as:
Term Work Marks = Sum of Total Marks Scored in FA / (50 x Total Number of Experiments)

3. A Summative (comprehensive) Assessment (SA-PR) of Practical will be performed as End Semester Examination (ESE). The SA-PR will be before 25 Marks with MSBTE guidelines at the end of semester. The schedule of MSBTE Practical ESE will be display on Notice board prior to examination.

● Practical

1. Suggested Books for Reference:

Sr. No	Title of the Book	Author	Publication
1.	Data Structure Using C	ISRD Group New Dehli	Tata McGraw-Hill
2.	Data Structure Using C	Reema Thareja	OXFORD University Press
3.	Introduction to data structures in C	Ashok Kamthane	Pearson
4.	C & Data Structures	Prof. P.S. Deshpande, Prof D.G. kakde	Dream Tech press
5.	Data structures Algorithms Using C	Amitava Nag & Jyoti Prakash Singh	Vikas
6.	Data Structures with 'C' (SIE)	Lipschutz	McGraw Hill Education, New Delhi ISBN:978-0070701984
7.	Data Structures using 'C'	Balgurusamy , E.	McGraw Hill Education, New Delhi 2013,ISBN: 978-1259029547
8.	Understanding Pointers in C	Yashwant Kanetkar	BPB ISBN 8170298911

2. Learning Websites & Portal

Sr. No	URL	Description
1	https://www .javatpoint.com/data-structure-introduction	For All Contents
2	https://www .geeksforgeeks.org/introduction-to-data-structures/	For All Contents
3	https://studytomorrow.com/data-structures/	For All Contents
4	https://www.tutorialspoint.com/data_structures_algorithms/	For All Contents
5	https://www .w3schools.in/data-structures/	For All Contents
6	https://www .mygreatlearning.com/blog/data-structure-tutorial-for-beginners/	For All Contents
7	https://byjus.com/gate/introduction-to-data-structure-notes/	For All Contents

3. Video reference URL

Sr. No	URL	Description
1	https://youtu.be/C46QfTjVCNU	Linear Search
2	https://youtu.be/V_T5NuccwRA	Binary Search Algorithm with example
3	https://youtu.be/o4bAoo_gFBU	Bubble Sort Algorithm

Sr. No	URL	Description
4	https://youtu.be/bxRVz8zklWM	Stack in Data Structure
5	https://youtu.be/PAceaOSnxQs	Infix to Postfix using Stack
6	https://youtu.be/ygK0YON10sQ	Recursion and Stack
7	https://youtu.be/dq3F3e9o2DM	Insertion of a Node in Linked List(at Beginning, End, Specified Position)with Code
8	https://youtu.be/v4szCPs9yEY	Insertion in Doubly Linked List(beginning, end, specific position)
9	https://youtu.be/fmfxlC4TTxw	Circular Linked List in Data Structure
10	https://youtu.be/ReGglEXEH08	Insertion in Circular Linked List
11	https://youtu.be/EkE6RHuMx3I	Deletion of a Node from Circular Linked List(beginning, end, given position)
12	https://youtu.be/-b2lciNd2L4	Binary Tree Traversals (Inorder, Preorder and Postorder) Data structures and algorithms
13	https://youtu.be/cySVml6e_Fc	Binary Search Trees (BST) - Insertion and Deletion
14	https://youtu.be/vf-cxgUXcMk	BFS and DFS Graph Traversals
15	https://youtu.be/84BsI5VJPq4	Evaluation of Postfix Expression
16	https://youtu.be/op_NxwPY61I	Evaluation of Prefix expression
17	https://youtu.be/ygK0YON10sQ	Recursion and Stack
18	https://youtu.be/v9BMdz5m5Vo	Linear Queue Implementation - Array

3. Tools to Use for Teaching-Learning, Assessment and Evaluation:

- **Turbo C** – To write and execute C program as well as to debug the C program.
- **Google Classroom** – To share E-materials and all the required documents for preparing assignments and self-learning activities.

Mr.S.K.Mahajan
(Name & signature of staff)

Prof. M.P.Bhosale
(Name & signature of HOD)

CC-

- DSU-313301 Course File
- Notice Board / ERP
- Institute Website / CIAAN Coordinator