



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:IV
Class:SY	Program:B.Tech
Branch Code:COM/CSD	Pattern:2023
Name of Course:Data Structures	Course Code:2301212
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1a) Explain the quick Sort algorithm with a step-by-step example. Consider elements [54, 32, 98, 24, 76, 44, 22, 88, 65] to demonstrate how the algorithm works (6) CO1

Question No. 2

- 2a) Explain how strings are represented in C. Write a C program that takes a string input from the user and counts the number of vowels in the string. (6) CO2

Question No. 3

- 3a) Explain the differences between linear, circular, and doubly linked lists. Which is considered most efficient? (5) CO3

OR

- 3b) How would you implement a queue using a singly linked list? Describe enqueue and delete operations (5) CO3

- 3c) Explain how linked lists(dynamic memory) are different from arrays. Explain with pictorial representation (5) CO3

OR

- 3d) Write a pseudo code/algorithm to **insert a node at the end** of a singly linked list. Mention the time complexity and compare it with insertion at the beginning. (5) CO3

- 3e) A linked list stores characters of a string. Write an algorithm/ pseudo code to count occurrence of a character of the string (6) CO3

OR

- 3f) What is GLL ? Represent the following polynomial using GLL (6) CO3
 $12x^5 + 10x^4y + 15xz$

Question No. 4

- 4a) Convert the expression into infix and prefix form EC+ ML*H - FG /** (5) CO4

OR

- 4b) What is a stack in data structures? What is LIFO in the context of stacks? (5) CO4

- 4c) Given a prefix expression, design an algorithm to convert it to an infix expression using a stack. Explain each step with an example (5) CO4

OR

- 4d) Explain string reverse operation using stack with example (5) CO4

- 4e) Perform deque operations (insertion and deletion at both ends) on the following sequence of elements: 10, 20, 30, 40. Show the queue status after each operation. (6) CO4

OR

- 4f) Apply the circular queue algorithm to insert and delete elements from a queue of size 5. Show front and rear positions after each step. (6) CO4

Question No. 5

- 5a) Using the modulo-division method and linear probing, store the following keys in hash table of size 19 records. How many collisions occurred? What is the density of the list after all the keys have been inserted? (5) CO5

224562, 137456, 214562, 140145, 214575, 162145, 144467, 199645, 234534

OR

- 5b) A hash function f defined as $f(\text{key}) = \text{key} \text{ MOD } 7$, consider linear probing is used to insert the keys 37, 38, 72, 48, 98, 11, 56 into a table indexed from 0 to 6. Show the contents of hash table after inserting all the keys. (5) CO5

- 5c) What is collision? What are different collision resolution techniques? Explain any two methods in detail. (5) CO5

OR

- 5d) What is the hash function ? Explain the following hash functions : (5) CO5

(i) Mid-square

(ii) Modulo Division

(iii) Folding Method

(iv) Multiplication method

- 5e) Given the input {4371, 1323, 6173, 4199, 4344, 9699, 1889} and hash function as $\text{Key} \% 10$, show the results for Open addressing using double hashing $h_2(x) = 7 - (x \text{ MOD } 7)$ (6) CO5

OR

- 5f) Using the modulo-division method and linear probing, store the following keys in an array with 11 records. How many collisions occurred during insertion? What is the density of the list after all the keys have been inserted? (6) CO5

Keys: 27, 45, 33, 18, 52, 61, 47, 39

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