



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

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester:III
Class:SY B.Tech.	Program:B.Tech
Branch Code:ADS/COM/CSD	Pattern:2022
Name of Course:Fundamentals of Data Structures	Course Code:COM222001
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 03 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.

**Question No. 1 Attempt following Question**

- 1 a) Explain following terms with suitable example (6) CO1  
1) Algorithm 2) Data structure (3 marks)  
b) Compare Linear and Nonlinear Data structure (3 marks)

**Question No. 2 Attempt following Question**

- 2 a) Write the algorithm for Simple transpose of sparse matrix (3 marks) (6) CO1,  
CO2,  
CO3  
b) Write user defined function to concatenate two strings (3 marks)

**Question No. 3 Attempt following Question**

- 3.a) Write a pseudo code to reverse a string using singly link list (6) CO1,  
CO2,  
CO3

**OR**

- 3.b) With the help of diagram and pseudo code explain search operation on singly link list. (6) CO1,  
CO2,  
CO3  
3.c) Write ADT for doubly circular Linked List (5) CO1,  
CO2,  
CO3

**OR**

- 3.d) What is a doubly linked list? Explain the process of deletion of an element from a doubly linked list with an example. (5) CO1, CO2, CO3
- 3.e) Use Generalized Linked List to represent a polynomial of the following example. (5) CO1, CO2, CO3
- $$9x^5 + 7x^4y + 10xz$$

**OR**

- 3.f) List various operations performed on the linked list and explain traverse operation in detail (5) CO1, CO2, CO3

**Question No. 4 Attempt following Question**

- 4.a) Define the following terms with example: (6) CO1, CO2, CO4
- i) Dequeue ii) Multiqueue

**OR**

- 4.b) With the help of diagram, compare linear queue and circular queue implementation using arrays (6) CO1, CO2, CO4
- 4.c) Write a C++ code to implement a stack using array (5) CO1, CO2, CO4

**OR**

- 4.d) Write an algorithm for postfix expression evaluation, and explain the need of stack for it (5) CO1, CO2, CO4
- 4.e) Convert following arithmetic infix expression to postfix expression (5) CO1, CO2, CO4
- $$((a / (b - c + d)) * (e - a) * c$$

**OR**

- 4.f) With the help of diagram explain string reverse operation using stack (5) CO1, CO2, CO4

**Question No. 5 Attempt following Question**

- 5.a) Compare sequential search and binary search with appropriate example. Comment on their time complexity and space complexity (6) CO1, CO5

**OR**

- 5.b) Construct a pseudo C++ code to sort the data using insertion sort in ascending order (6) CO1, CO5
- 5.c) Explain quick sort and sort the given list using quick sort 15,8,20,-4,16,2,1,12,21,-2 (5) CO1, CO5

**OR**

- 5.d) Write an algorithm for binary search & discuss its time complexity (5) CO1, CO5
- 5.e) Explain the term stability of sorting. Explain with the help of example why bubble sort is a stable sort in short (5) CO1, CO5

**OR**

- 5.f) Sort the given list using shell sort 20,12,65,8,10,16,43,35,23,88,2,56,41,27,67,56 (5) CO1, CO5

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