Modern Education Society's College of Engineering, Pune - 411 001
Department of Computer Engineering
Academic Year 2023-24
Question Bank

Subject: Fundamentals of Data Structures
Class: SE

Unit 1

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Define algorithm and its characteristics.	CO1	4		✔		
Q.2	Explain asymptotic notations Big O, Theta and Omega with one example of each.	CO1	6		✔		✔
Q.3	Differentiate between linear and non-linear data structure with example	CO1	3		✔		
Q.4	Explain divide and Conquer strategy with example. Also comment on its time analysis	CO1	6			✔	✔
Q.5	Define and explain the following terms, 1. Data structure 2. ADT 3. Algorithm	CO1	3	✔	✔		
Q.6	Explain the Greedy strategy with sutaible example. Comment on its time complexity.	CO1	6			✔	✔
Q.7	Define and explain the following terms: 1. Linear Data structure 2. Non-linear Data structure 3. Time complexity 4. Space complexity	CO1	4			✔	✔
Q.8	Define and explain following term: Data	CO1	1	✔	✔		
Q.9	Explain static and dynamic data structure with example.	CO1	4		✔		
Q.10	What is recurrence relation? Explain with example.	CO1	2	✔			✔
Q.11	Explain merge sort with example.	CO1	6	✔	✔		
Q.12	Why do we need data structure?	CO1	2				✔

Unit 2

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Derive address calculation formula for one dimentional array with one example.	CO1	2		✔		
Q.2	Write pseudo c/c++ code to perform polynomial addition using arrays.	CO1	6			✔	✔
Q.3	Write pseudo c/c++ code to perform simple transpose of sparse matrix. Discuss its time complexity.	CO1	6		✔	✔	
Q.4	Explain polynomial representation using arrays with suitable example.	CO1	3		✔	✔	
Q.5	Explain fast transpose of sparse matrix with suitable example. Discuss time complexity of fast transpose.	CO1	6		✔		✔
Q.6	What is sparse matrix? Explain with suitable example.	CO1	6		✔	✔	
Q.7	Give pseudo code to concatenate two strings.	CO1	3			✔	
Q.8	Define and explain: Sequential Organization	CO1	2		✔		
Q.9	Define and explain: Ordered List	CO1	2		✔	✔	
Q.10	Define and explain: Sparse Matrix	CO1	2		✔		
Q.11	Give pseudo code for reversing a string.	CO1	4		✔	✔	
Q.12	Explain the need for fast transpose of sparse matrix comment on its time complexity.	CO1	6	✔			

Unit 3

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Write an algorithm for Fibonacci search and find out time complexity.	CO1	7		✔	✔	
Q.2	Explain Quick sort and sort the given list using quick sort: 15,08,20,-4,16,02,01,12,21,-2	CO1	6		✔		
Q.3	Write short note on stability of sorting	CO1	7		✔		
Q.4	Explain shell sort and sort the given list using shell sort	CO1	6		✔		
Q.5	Write an algorithm for binary search. Derive recurrence relation and find out time complexity of the search	CO1	7		✔	✔	
Q.6	Explain sequential search and binary search with appropriate example and compare their time complexity and space complexity	CO1	7		✔	✔	
Q.7	Explain heap sort and sort the given list using heap sort : 18,13,12,22,15,24,10,16,19,14,30	CO1	7		✔		
Q.8	Sort the following numbers using insertion sort: 55,85,45,11,34,05,89,99,67 Discuss its time complexity and space complexity	CO1	6		✔	✔	
Q.9	Explain merge sort using the following example: 18,13,12,22,15,24,10,16,19,14,30 Discuss its time and space complexity	CO1	6		✔	✔	
Q.10	Write a pseudo C/C++ code to sort the data using bucket sort in ascending order	CO1	7		✔		

Unit 4

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	With suitable example discuss representation and implementation of polynomial using singly linked list.	CO1	6		✔		✔
Q.2	What is GLL? Represent $-4x^4y^2z^3+10x^2yz^2+7xyz+45$ using GLL.	CO1	7		✔		✔
Q.3	Write a pseudo code to delete any node in case of DLL.	CO1	6		✔		
Q.4	Establish the usage of linked lists for polynomial manipulation.	CO1	6			✔	✔
Q.5	Let X = (X1, X2, X3,....Xn) and Y= (Y1, Y2, Y3,....Xm) be two linked lists.Write an algorithm to merge the lists together to obtain the linked list Z such that Z = (X1, Y1, X2, Y2,....Xm, Ym,Xm+1....Xn) if m<=n or Z = (X1, Y1,X2,Y2....Xn,Yn,Yn+1....Ym) if m>n.	CO1	8		✔		✔
Q.6	What are the advantages of circular linked list over singly linked list?	CO1	6	✔		✔	
Q.7	Explain doubly linked list with advantage and disadvantage of it.	CO1	6	✔		✔	
Q.8	Write short note on Dynamic memory management.	CO1	5	✔	✔		
Q.9	Write a pseudo C/C++ code to insert node into a singly linked list.	CO1	7	✔	✔		
Q.10	Explain Generalized linked list with suitable example.	CO1	6	✔			✔
Q.11	Convert the following prefix expression into postfix. * + a – bc / – de + – fgh	CO1	7	✔	✔		
Q.12	Write an algorithm to delete intermediate node from Doubly linked list.	CO1	7		✔		

Unit 5

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Write an algorithm to evaluate a postfix expression. Execute your algorithm using the following postfix expression as your input : a b + c d +*f ↑ .	CO2	7		✔		
Q.2	Write down any four application of a stack.	CO2	6			✔	✔
Q.3	Write an algorithm to convert postfix to infix.	CO2	6	✔	✔		
Q.4	Write a C function using stack to determine whether the given string is palindrome or not.Find out time complexity of program.	CO2	9		✔	✔	✔
Q.5	What is backtracking algorithmic strategy. Explain the use of stack in it with example.	CO2	7		✔		✔
Q.6	Explain evaluation of postfix expression using stack with suitable example.	CO2	6		✔		✔
Q.7	Give pseudo C/C++ code to implement the following operations on linked stack : (i) Create (ii) Push data.	CO2	6	✔		✔	✔
Q.8	Explain the stepwise conversion using stack for the given infix expression to the postfix expression A * B + C * D.	CO2	6	✔	✔		
Q.9	Write pseudo C/C++ code for polynomial addition using singly linked list.	CO2	7		✔	✔	✔
Q.10	Explain stack overflow and underflow conditions	CO2	4	✔	✔		
Q.11	Define stack and write abstract data type for stack.	CO2	5	✔	✔		
Q.12	Write short notes on : (a) Stack application (b) Multi-stack.	CO2	6	✔		✔	✔

Unit 6

Q.NO	Questions	CO Mapped	Marks	Memory Based	Conceptual	Analytical	Application
Q.1	Write pseudo C/C++ code to represent deque and perform the following operations: a. Create Deque b. Insert c. Delete d. Display	CO1	7	✔	✔		
Q.2	What is circular Queue? Explain the advantages of circular Queue over linear Queue	CO1	6		✔		
Q.3	Write a pseudo C/C++ code to implement Circular Queue using Arrays	CO1	7	✔	✔		
Q.4	Explain applications of priority queue in detail.	CO1	6				✔
Q.5	Write pseudo C/C++ code to represent Queue as an ADT	CO1	7	✔	✔		
Q.6	Define the following terms with example: 1. Dequeue 2. Priority queue 3. Linear queue	CO1	6		✔		
Q.7	Explain Array implementation of priority queue with all basic operation	CO1	6		✔		
Q.8	Define the following terms with example 1. Linear Queue 2. Circular Queue 3. Priority Queue	CO1	6		✔		
Q.9	Write pseudo C/C++ code to implement linked Queue	CO1	7	✔	✔		
Q.10	Write Advantages and Disadvantages of the following terms 1. Linear Queue 2. Circular Queue 3. Priority Queue	CO1	6		✔	✔	