



Preparatory Examination 2021-22
Data Structure and Applications [18CS32]

Time: 3 hrs

Marks: 100

Date: 23/03/2022

Time: 9.30am-12.30pm

Note: Answer any 5 full questions, choosing one full question from each part.

| QN | Questions | Marks |
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| MODULE 1 | | |
| 1 | a) What is structure? How it is different from array? Explain dynamic memory allocation functions with syntax and example. --- | 10 |
| | b) Write the Knuth Morris Pratt (KMP) pattern matching algorithm and apply the same to search the pattern 'abcdabcy' in the text: 'abbzabzabzabcdabcy' | 10 |
| OR | | |
| 2 | a) Give the ADT for sparse matrix. Express the given sparse matrix in its triplet form and write the function for its transpose. $A = \begin{bmatrix} 10 & 0 & 0 & 25 & 0 \\ 0 & 23 & 0 & 0 & 45 \\ 0 & 0 & 0 & 0 & 32 \\ 42 & 0 & 0 & 31 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 30 & 0 & 0 \end{bmatrix}$ | 10 |
| | b) Write an algorithm for bubble sort. Trace the algorithm for the data : 30,20,10, 40, 80, 60, 70. | 10 |
| MODULE 2 | | |
| 3 | a) Write an algorithm to convert infix to postfix expression. Trace the following with stack: (A+B)*(C+D-E)*F | 10 |
| | b) Write a C program to demonstrate (a) Towers of Hanoi problem (b) Binomial coefficient calculation.(factorial) | 10 |
| OR | | |
| 4 | a) Write the algorithm to implement a stack using dynamic array whose initial capacity is 1 and array doubling is used to increase the stack's capacity (that is dynamically reallocate twice the memory) whenever an element is added to full the stack. Implement the operations – push, pop and display | 10 |
| | b) Write the static implementation of circular queue in C language. With illustration, Explain major limitations of queue. | 10 |
| MODULE 3 | | |
| 5 | a) Define sparse matrix. Give the sparse matrix representation of linked list for a given matrix $A = \begin{bmatrix} 0 & 0 & 4 & 0 & 0 \\ 6 & 5 & 0 & 0 & 0 \\ 0 & 3 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}$ | 10 |
| | b) Write the node structure for linked representation of polynomial. Explain the | 10 |



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| | algorithm to add two polynomials represented using linked lists. | |
| OR | | |
| 6 a | Give the node structure to create a singly linked list of integers and write functions to perform the following (i) Create a list (ii) Assume the list contains 3 nodes with data 10, 20, 30. Insert a node with data 40 at the end of the list (iii) Insert a node with data 50 between the nodes having data values 10 and 20 (iv) Display the singly linked list | 10 |
| b | Write functions insert_front and delete_front using doubly linked list. | 10 |

MODULE 4

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| 7 a | Given inorder sequence: DJGBHEAFKIC and postorder sequence: JGDHEBKIFCA. Construct binary tree and give preorder traversal. | 10 |
| b | What is a tree? With suitable example define (i) Binary tree (ii) Level of a binary tree (iii) Complete binary tree (iv) Strictly binary tree | 10 |

OR

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| 8 a | For the given data draw a binary search tree 1,3,8,5,7,9,10,12,15,14,13,11,6. Traverse the above generated tree using inorder, preorder and postorder, Also write a function in C for each one. | 10 |
| b | What is expression tree? Construct a expression tree for the given expression i. $((6+(3-2)*5)^2 + 3)$ ii. $A-B/C^D+E*F$ | 10 |

MODULE 5

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| 9 a | Define Graph. Give the matrix and adjacency list representation for the weighted graph given below | 10 |
| | | |
| b | What is collision? What are the methods to resolve collision? Explain linear probing and chaining with an example. | 10 |
| OR | | |
| 10 a | Write a short note on hashing. Explain any 3 popular HASH functions. | 10 |
| b | What do you understand by the term file organization? Briefly summarize any 3 widely used file organization techniques. | 10 |