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Supplementary/Improvement Examination-2023

Paper Name: Introduction to Data structures
Time: 3 hours

Paper Code: BCA 201
Maximum Marks : 75

Follow proper numbering for answering the questions

Section A. Attempt all questions

Each question carries 1 marks. (35X1)

- Q1. Which data structure allows insertion from rear end and deletion of elements from front end _____?
- Q2. Stack allows insertion at _____ end and deletion at _____?
- Q3. Which of the following data structure is non-linear?
a) Stack b) Array c) Linked List d) None of the above
- Q4. What is a linear data structure?
- Q5. To represent a line in bank counter, which data structure is most suitable?
a) Stack b) Queue c) Tree d) String
- Q6. The worst case occurs in a linear search algorithm when-
a) Item is in the middle of the list b) Item is not in the list
c) Item is in the last d) Both option b and c
- Q7. The total number of comparison in a bubble sort algorithm is $O(\quad)$?
- Q8. In a linked list there are multiple links from any node in -
a) Singly Linked list b) Doubly Linked List c) Circular Linked List d) None of the above
- Q9. The result of evaluation a prefix expression $* / b + a c d$, where $a=3, b=6, c=1, d=5$ is _____
- Q10. The situation when in a linked list $START=NULL$ is _____
- Q11. The dummy header in a linked list contains _____
a) First record b) Second record c) Middle record d) Last record
- Q12. What is a NULL pointer?
- Q13. A Queue is -
a) LIFO b) FIFO c) Both d) None
- Q14. Removing an element from the top of the stack without printing/returning is called as -
a) Push operation b) Pop operation c) Peek operation d) Traverse operation
- Q15. Insertion of item in middle without overwriting the existing elements is costly (take more time) in -
a) Array b) Singly Linked List c) Doubly Linked List d) Circular Linked List
- Q16. In a Doubly Linked list each node contains link to it's
a) Predecessor b) Successor c) Both d) To the head node
- Q17. Last node reference in a Singly Linked list is to _____
- Q18. To represent a node in a linked list we use which data type?
a) Float b) struct c) int d) char
- Q19. _____ the list means that we can visit all the nodes of the list starting from the first node.
a) Insertion b) Deletion c) Traversing d) Push
- Q20. A singly linked list does not allow
a) Random access b) Insertion at the beginning c) Deletion at the beginning d) Insertion at the end
- Q21. Array passed as an argument to a function is interpreted as
a) Address of the array b) Value of the first element of the array
c) Address of the first element of the array d) Number of elements of the array
- Q22. For a computing device which of these expressions is best for evaluation of the expression?
a) Infix b) Prefix c) Postfix d) All equally good
- Q23. Convert from infix to prefix the following expression $((a/b)+c)-(d+(e*f))$
- Q24. Assume the array-based implementation of a stack of size N. What will be the value of the index variable top when the stack is full?
- Q25. A graph is a tree if and only if graph is _____
- Q26. The standard name of the operation in a queue to remove an element is -
a) Enqueue b) dequeue c) traverse d) pop
- Q27. The minimum number of elements in the node of which following type could be same -
1. Singly Linked List and Doubly Linked List 2. Singly Linked List and Circular Linked List
3. Doubly Linked List and Circular Linked List 4. All the above have the same node structure.
- Q28. `struct node* temp;` `temp = (struct node*) malloc(sizeof(struct node));`
The purpose of the above lines of the code is _____
1. Static initialization of temp (node element) 2. Dynamic initialization of temp (node element)
3. Static deallocation of temp (node element) 4. Dynamic deallocation of temp (node element)
- Q29. What does the below lines of code doing for a singly linked list -
`struct node *t;`
`t = start->next;`
`free(start);`
1. Delete node from the beginning 2. Delete node from the end

3. Delete node from the mid position 4. Delete node from mid position+1

Q30. Re-write the below code to make the 2-D point user-defined data type to a 3-D point data type.

```
struct Point
{ int x, y; };
```

Q31. The output of the following code is –

```
printf("Size is %d byte.\n", sizeof(char));
```

1. Size is 1 byte 2. Size is 2 byte 3. Size is 3 byte 4. Size is 4 byte

Q32. Which of the following sorting algorithm is based on “divide and conquer”

1. Bubble sort 2. Selection sort 3. Quick sort 4. All the above

Q33. The time complexity of quicksort is _____

Q34. For a sequence with n=8, ie (10, 25, 2, 4, 7, 13, 11, 22)

The number of comparisons in a linear search to find 10 is

1. Just 1 comparison 2. n comparisons 3. n+1/2 comparisons 4. n-1 comparisons

Q35. Which data type in c-language used for storing a number with fraction

1. int 2. char 3. float 4. array

Section B. Attempt any four questions

Each question carries 5 marks. (4X5)

Question	CO	BL
Q1) Create a structure of BankAccount data type with fields as “name”, “accountNo”, “accountType” and “branch”. Create two elements of BankAccount data type. Populate them with suitable values and print the details of one of the Bank Account.	CO1	6
Q2) What is a Insertion sort? Write a c-program for Insertion sort.	CO3	2
Q3) Write a c-program for binary search and show the search steps with mid-index, min-index and max- index for the following sequence for the search element=47. Sequence:- 11,13,15,17,18,19,21,23,27,31,39,42,45,49,53,54,59,61	CO3	3
Q4. What problems can arise with the array-based implementation of the stack ADT? Describe one way of overcoming the problem.	CO3	5
Q5) What is a Circular Linked List. Write the c-functions to implement traversal.	CO2	3
Q6) Explain the difference between a primitive and user defined data types in C with the help of suitable examples.	CO1	1

Section C. Attempt any two questions.

Each question carries 10 marks.(2X10)

Question	CO	BL
Q1) What is infix, pre-fix and post-fix notation. Give examples of each. Write a c-program to convert a infix expression to a postfix expression.	CO4	3
Q2) What is a stack? Write a c-program to implement Stack using arrays. Implement the Push(), Pop(), Peek() and Traverse() operations with a description in comment of these functions. Demonstrate all these operations in the code.	CO4	4
Q3) Answer the following: a) In implementing a singly linked list, why is it useful to maintain a pointer to the tail of the list as well as the head? (3 marks) b) What is a doubly linked list and how does it differ from a singly linked list? (3 marks) c) A stack may be implemented using an array to store the underlying data items. What implementation issue arises in this case and how is it typically dealt with? (4 marks)	CO2	4
Q4) What is a binary tree? Define its various types. Write down the inorder, preorder and postorder traversal of the following binary tree.	CO5	3

