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Even Semester Examination 2023 (Backlog)

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 mark. (35X1)

- Q1. What is a linear data structure?
Q2. What is a NULL pointer?
Q3. 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
Q4. Which data structure allows both insertion and deletion of elements from top _____?
Q5. Last node reference in a Singly Linked list is to _____
Q6. 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?
Q7. Convert from infix to prefix the following expression $((a/b)+c)-(d+(e*f))$
Q8. In a linked list there are no NULL links in –
a) Singly Linked list b) Doubly Linked List c) Circular Linked List d) All of the above
Q9. The result of evaluation a prefix expression $*b+-adcd$, 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. Queue allows insertion at _____ end and deletion at _____?
Q13. A _____ data structure is based on FIFO principle.
Q14. Which of the following data structure is non-linear?
a) Stack b) Array c) Linked List d) None of the above
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. To represent a hierarchical relationship, which data structure is most suitable?
a) Stack b) Queue c) Tree d) String
Q18. _____ data type is used to represent a node in a linked list.
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. What is the total number of comparisons in bubble sort algorithm?
Q24. `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) 3. Dynamic initialization of temp (node element)
2. Static deallocation of temp (node element) 4. Dynamic deallocation of temp (node element)
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. 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
Q29. In C programming language, _____ data type is used for storing a number with fraction.
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. What is the complexity of quicksort?

Q34. For a sequence with n=10, i.e. (11, 50, 20, 14, 17, 3, 15, 12, 19, 6)

The number of comparisons in a linear search to find 15 is

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

Q35. What does the below lines of code doing for a singly linked list –

```
struct node *n;  
n = start->next;  
free(start);
```

1. Delete node from the beginning
2. Delete node from the end
2. Delete node from the mid position
4. Delete node from mid position+1

Section B. Attempt any four questions

Each question carries 5 marks. (4X5)

Question	CO	BL
Q1) Create a structure of Book data type with fields as "author", "subject", "Title" and "ISBN". Create two elements of Book data type. Populate them with suitable values and print the details of one of the books.	CO1	6
Q2) What is an 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=5. Sequence:- 1,3,5,7,8,9,11,13,17,21,29,32,35,39,43,44,49,51	CO3	3
Q4. Evaluate the postfix expression using stack. 123*+45*6+7*+ (All operands are single digit numbers). Show in each steps the character scanned, stack content and the output string.	CO3	5
Q5) Differentiate between the singly and doubly Linked List. Illustrate how we can perform traversal in both directions.	CO2	3
Q6) What are the different types of data types in C programming? Explain each with the help of suitable examples.	CO1	1

Section C. Attempt any two questions. marks.(2X10)

Each question carries 10

Question	CO	BL
Q1) What is infix, pre-fix and post-fix notation. Give examples of each. Write a c-program to convert an 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
Q2) What is a Queue? Write a C-program to implement a Queue using arrays. Implement the Enqueue() and Dequeue() operations with a description in comment of these functions. Demonstrate all these operations in the code.	CO2	4
Q4) What is a binary tree? Define its various types. Consider your own binary tree and write down the inorder, preorder, and postorder traversal of the same.	CO5	3

BL – Bloom's Taxonomy Levels (1-Remembering, 2-Understanding, 3-Applying, Evaluating, 6-Creating)

4-Analysing, 5-