ASHA M. TARSADIA INSTITUTE OF COMPUTER SCIENCE AND TECHNOLOGY

B.Tech CSE, SE and CC

Class Test – 1 Syllabus (2022-23)

Semester –4

Subject Name: DSA

Assignment-1

1. What do you mean by Data Structure? Give the difference between Primitive and Non-primitive data structures.
2. Give the classification of data structure. Explain linear and non- linear data structure with example.
   Define Data Structure and differentiate between linear and nonlinear data structures.
3. What is Algorithm? Explain properties and Design tools of algorithm? Write short note on performance analysis and performance measurement of an algorithm.
4. Explain asymptotic notations with example. Define Time complexity and Space complexity. Calculate time complexity for given expression.

```
for (k=0; k<n; k++)
{
rows[k] = 0; for (j=0; j<n; j++)
{
rows[k] = rows[k] + matrix[k][j];
total = total + matrix[k][j];
}
}
```

5. What is Array? Explain types and operation of array? Explain Multidimensional Array. How it is stored in memory?
6. What is recursion? Explain factorial with algorithm.
7. Solve following problems:
   I. Given a two-dimensional array Z1(2:9, 9:18) stored in column-major order with base address 100 and size of each element is 4 bytes, find address of the element Z1(4, 12).
   II. Consider array int a [3][4] declared in C program. if the base address is 1050 find the address of the element a [3][2] with row major & column major representation.
8. Evaluate the following postfix expression using stack:
   (a) 9 3 4 * 8 + 4 / - (b) 5 6 2 + * 1 2 4 / - +
9. What is sparse matrix? Explain memory representation of sparse matrix.
10. What is Stack? Write down algorithms for performing PUSH, POP, CHANGE and PEEP operations on a stack.
    List out the applications of the stack?
    Write a pseudo code for PUSH and POP operations of stack.
11. Write an algorithm to convert infix expression into postfix expression with parenthesis and write an algorithm to convert infix to prefix expression and explain it with example.

12. Solve following problems:Translate the following string into polish notation and trace the content of stack i. A - (B / C + (D % E * F) / G) * H

13. Write algorithm for postfix to infix and prefix to infix.

14. Evaluate the following postfix expression in tabular form showing stack after every step. 7 6 + 4 * 4 10 + - 5 +

15. Given Inorder and Preorder traversal, find Postorder traversal.
Inorder:Y B K C F A G X E D H Z
Preorder:G B Y A C K F X D E Z H

16. Draw a Binary expression tree for the following and perform preorder traversal:
a * (b + c) + (d * e) / f + g * h

17. Write a C program to reverse a string using stack.

18. What is Queue? Write an algorithm to implement insert and delete operation into a Simple Queue using array representation of Queue

19. Write an algorithm for circular queue that insert an element at rear end.

20. Explain types of Queues? Compare Simple Queue and Circular Queue. Write an algorithm to implement insert and delete operation into a Double Ended Queue using array representation of Queue.

21. Consider a dequeue given below which has LEFT=1, RIGHT=5

_ A B C D E _ _ _ _.

Now perform the following operations on the dequeue
1. Add F on the left.
2. Add G on the right.
3. Add H on the right.
4. Delete two alphabets from left
5. Add I on the right

22. Differentiate between stack & queue. Also explain priority queue.

23. Illustrate the working of priority queue with suitable example.

24. Write an algorithm to insert node at a first location in singly linked list.

25. Write an algorithm to insert node at a last location in singly linked list.

26. Write an algorithm to insert node into ordered list in singly linked list.

27. Compare Array and Link list.

28. Write an algorithm to delete node in singly linked list.

29. Write an algorithm to count node in singly linked list.

30. Write an algorithm to copy node in singly linked list.

31. Write an algorithm to insert node at a first location in circular linked list.

32. Write an algorithm to insert node at a last location in circular linked list.

33. Write an algorithm to insert node into ordered list in circular linked list.

34. Write an algorithm to insert node in doubly linked list.

35. Write an algorithm to delete node in doubly linked list.

36. What is Linked list? Explain types of linked list with advantage and disadvantage.

(Subject Teacher)

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