DSA – Question Bank

1. Implement the stack operations using C programming.
2. Convert the following infix expression to postfix expression
   - (A+(B*(C-D))*E/(F-G)^H+I)
3. Convert the following infix expression to prefix expression
   (M-N*(O+P)^(Q+(R*S)/T)+U*V)

4. Implement the conversion of infix to prefix expression using stack by C programming. Trace the following expression according to program.
   (M-N*(O+P)^(Q+(R*S)))

5. Implement the conversion of infix to postfix expression using stack by C programming. Trace the following expression according to program.
   (A+(B*(C-D))*E/F-G)
6. Implement the recursion concept to find an element in a given array using binary search in C program.
7. Define a STUDENT structure with USN, Name, and Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name and the average marks of all the students.
8. What is structure? How is it different from an array? Explain different types of structure declarations with an example.
9. Write a program to read n numbers and sort them in ascending order using arrays.
10. Define arrays. Explain in detail single and double dimension arrays with an example.
11. Discuss array. Write a program to multiply two matrices.
12. Discuss arrays. Write a program to find max and min elements in the given array.
13. Convert the following infix expression to prefix and postfix expression.
    i)   (A + B ^ C) / D + E   ii) A * B / C + (D + E) * F
14. Define queue? Give the implementations insert and delete and display functions. Include a check for empty and full conditions.
15. What is the advantage circular queue over ordinary queue? Explain the following operations.
    1. Insert
    2. Delete
16. Define recursion. Write a recursion function for the following
    Factorial number.
    Tower of Hanoi.
17. Write an algorithm to evaluate infix to postfix expression and apply the same for the given postfix expression ABC-D*+E%F+ and assume A=6, B=3, C=2, D=4, E=3, F=6.
18. Write a C Program and explain to simulate the working of a stack of integers using an array. Provide the following operations:
    a. Insert   b. Delete   c. Display
19. Write a singly linked list function
    Insert beginning.

Delete end.

Insert end

20. What is doubly linked list and write the following functions.

Insert end.

Delete beg.

21. Construct the Binary tree for the following numbers and Write in-order pre-order and post-order for the following numbers.

100 120 125 135 119 90 85 95

22. What is tree? Explain with an example.

i)   Binary tree.

ii)   Complete binary tree.

iii)   Degree of tree.

iv)   Strictly binary tree.

23. Write a function for the following

1. Inorder

2. Postorder

3. Preorder

24. Define an algorithm? Analyze the fundamentals of algorithmic problem solving?

25. Consider the following algorithm.

ALGORITHM Enigma (A[o .. n-1,0 ..n-1])

// Input: A matrix (A[o .. n-1,0 ..n-1]) of real numbers.

for i← 0 to n-2 do

for j← i+1 to n-1 do

if A[i,j] # A[j,i]

return false

Evaluate the following

1.   What are the basic algorithm compute.

2.   What is the basic operation?

3.   What is the efficiency class of this algorithm.

4.   What is the input size?

26. Arrange the following functions in ascending order

$n, 2n, n!, n\log n, \log_2 n, n^2, 2^n$

27. Demonstrate the asymptotic notations? Briefly explain with examples.

28. Consider if t1(n) € O(g1(n)) and If t2(n) € O(g2(n)) then prove that t1(n) + t2(n) € O (max{ g1(n), g2(n) })

29. Discuss important problem types.

30. Write an algorithm for quicksort and apply the quicksort for the following.

89 23 54 12 76 24 11

31. Write Prims algorithm to find minimum cost spanning tree. Apply it to find the minimum spanning tree for the graph shown given below. (assume edge values)
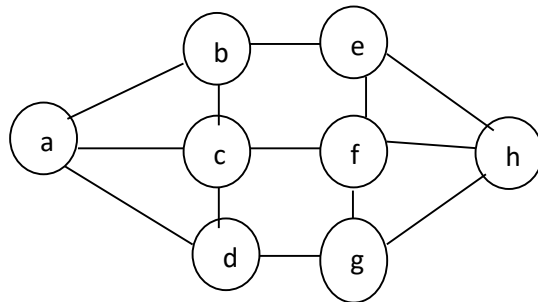
32. Write an algorithm for BFS and give an example.
33. Write an algorithm for merge sort and apply the merge sort for the following.
    89 23 54 12 76 24 11
34. Apply the DFS algorithm for the given graph and consider the starting vertex 'a' and also write an algorithm for DFS.
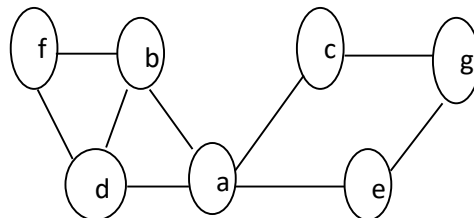
35. Discuss Binary Search with an example.
36. Define Algorithm. Illustrate the fundamentals of problem solving with neat diagram and an example.
37. Demonstrate the asymptotic notations with definition and an example for each notation.
38. Design an algorithm to sort an array elements using Bubble sort. Apply the algorithm to sort the following elements in ascending order.
           25, 9, 10, 1, 15, 2, 7
39. Design an algorithm for sequential string matching and apply the algorithm to search pattern "go" in the string "mango".
40. Design an algorithm to sort an array elements using quick sort. Apply the algorithm to sort the following elements in ascending order.
           25, 9, 10, 1, 15, 2, 7
41. Write DFS and BFS traversal algorithms and compare the algorithms based on their working and efficiency.
42. Write a C program to implement ordinary queue with following functions
         Insert, delete and display.
43. Write a C program to implement circular queue using array with following functions Insert, delete and display.
44. Write a C program to implement doubly linked list with following functions Insert at front, Delete at rear and Display.