DSA Assignment

1. What are ADT? Write an ADT for natural numbers.
2. Differentiate between data type and data structure. What are the two parts of definition. Explain.
3. Discuss the concept of ADT. Represent rational number as an ADT
4. Differentiate between ADT and C++ classes.
5. Explain the different type of primitive operations that we can perform on data structures.
6. Why data structure is needed? Explain the advantages of abstraction.
7. What is the condition of stack underflow and overflow. Write down the module for stack push and pop operation.
8. What is Data Structure? Show the status of stack converting following infix expression to post fix P + Q – (R*S/T+U)-V*W.
9. What are the advantages of postfix expression over infix expression. Convert the given infix expression into postfix showing the content of stack in each step. (A+B*C/D)+E*F-(G*H+I-J)
10. What are the limitation of linear queue? Write an algorithm to enqueue and dequeue elements in the circular queue.
11. Explain priority queues. Write an algorithm of insertion in linear queue.
12. Define list. What are the primitive operation performed on list? Explain the dynamic implementation of list with examples.

11. What is double linked list? Write an algorithm for deletion operation in double linked list?
12. How circular linked list can be implemented using a single linked list. Explain.

13. Write a algorithm to evaluate an arithmetic expression in Postfix string. Apply the algorithm to evaluate : AB + C – BA + C$ – (assume A = 1, B = 2, C = 3)
14. How can we implement stack as a linked list. Use appropriate algorithm to show operation of stack using linked list.
15. Evaluate the given expression using postfix notation.
    A * (B + C) - (D/E)
    Assume A=5, B=6, C=2, D=12, E=4

16. Write the algorithm for insertion in singly linked list at the beginning, at the end and at specified position.
17. What is a double ended queue? Explain the insertion algorithm in double ended queue.
18. Draw a BST from the string DATASTRUCTURE and traverse the tree in post order and preorder.

19. Construct the AVL tree from the following data given: 1,2,3,5,7,9,10,12
20. Define recursion and explain the algorithm which is used to solve the TOH problem.
21. Differences between recursion and iteration. Write an algorithm to find the fibonacci series using recursion.
22. Given Letters are to be inserted in order into an empty binary search tree: U, V, P, Q, M, N, O, R, K, W, C, D. Find the different tree traversal of this binary tree.
23. What is a balanced tree? Create an AVL tree from the given set of values: 5,7, 13, 9,6,3,14,10,4.

24. What is B-tree? Create a 3-order and 5-order B-tree using the following data: 3,2,5,9,6,11,33,23,7.
25. Write a short note on Game tree.
26. Sort the following data using heap sort.
    5,7, 13, 9,6,3,14,10,4.
27. For the given frequency of data, create a huffman tree.

Item	A	B	C	D	E	F	G
Weight	15	10	5	3	7	12	25

28. Construct binary tree using the following in-order and post-order traversal.
    Inorder: D B M I N E A F C J G K
    Post order: A B D E I M N C F G J K
29. Construct Huffmann tree for MISSISSIPPI with its optimal code.
30. Write an algorithm for bubble sort and sort the data using bubble sort
    5,7, 13, 9,6,3,14,10,4.
31. What is a quick sort? Sort the given data using quick sort.
    35,15,40,1,60,20,55,25,50,20.
32. Differentiate between linear and binary search. Write an algorithm for implementing binary search.
33. How can you resolve a collision? Using the divisive method, hash the given key values in a hash table of size 11 using linear, quadratic and double hashing.
    76, 26, 37, 59, 21, 65