QUESTION BANK FOR MID SEM

SEM-3- DESIGN OF DATA STRUCTURES (303105201)

1. What is a data structure? Explain its importance.
2. Differentiate between linear and non-linear data structures.
3. What are the primary operations that can be performed on a stack?
4. Describe the difference between a stack and a queue.
5. How does a circular queue differ from a regular queue?
6. Explain the concept of a linked list. How is it different from an array?
7. Difference between array and linked list
8. What are the main operations of a queue? Describe their time complexities.
9. What are the main operations of a stack?
10. Describe the algorithm for evaluating postfix expressions using a stack
11. Explain the concept of a singly linked list and provide an example.
12. How does a doubly linked list differ from a singly linked list?
13. What is a circular linked list, and how is it implemented?
14. What is linear search, and what is its time complexity?
15. Explain binary search. How does it improve search efficiency compared to linear search?
16. How does selection sort work?
17. Classify data structures with diagram.
18. Interpret Big O complexity chart.
19. Discuss Time complexity
20. Describe sparse matrix. Find the address of A [2][1] if base address is 1024 for an integer array A[5][4] in row major order and word size is 2 byte.
21. Given a two dimensional array A1(1:8, 7:14) stored in row-major order with base address 100 and size of each element is 4 bytes, find address of the element A1(4, 12).
22. Define dynamic memory allocation?
23. Define referential structure?
24. Array is a heterogeneous data type. (True/False). Justify your answer.
25. A m*n matrix which contains very few non-zero elements. A matrix contains more number of ZERO values than NON-ZERO values. Such matrix is known as ?
26. Convert infix to Postfix and Prefix
    1. (A + B) / C – D * E
    2. P ^ Q ^ R + S / T
    3. A * B – (C / D + (E – F)) ^ G
27. List applications of stack and Convert 2 * 3 / (2-1) + 5 * 3 infix expression into postfix format. Showing stacks status after every step in tabular form and evaluates that postfix notation.
28. Transform the following expression to postfix and evaluate postfix expression by assuming A=1,B=2,C=3,D=4,E=6,F=6,G=1,I=3 and J=3. INFIX- **A + B – C * D / E + F * G / (I + J)**
29. Differentiate between LIFO and FIFO access mechanism.
30. How linked list is better compared to stack, queue and array? Explain with concept of dynamic memory allocation.
31. In which type of scenario, linear queue (simple queue) is better than circular queue?
32. After evaluation of 3,5,4,*,+ result is ?
33. What will be the value of Front and Rear pointers when Queue is empty?

34. Apply selection sort algorithm on following input. 12, 29, 25, 8, 32, 17 , 40. Explain step by step.
35. Write an algorithm for bubble sort. Apply it on random 8 input data.
36. Write Merge Sort algorithm. Apply the algorithm to the following elements: 10,5,28, 7, 39, 310, 55,15,1