

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI - 600 086
(For candidates admitted during the academic year 2019 – 20 and thereafter)

SUBJECT CODE: 19CS/MC/AD23

B.C.A. DEGREE EXAMINATION – APRIL 2022
SECOND SEMESTER

COURSE : MAJOR CORE
PAPER : ALGORITHMS AND DATA STRUCTURES
TIME : 3 HOURS

MAX. MARKS: 100

SECTION A

ANSWER ALL THE QUESTIONS:

(20 x 1=20)

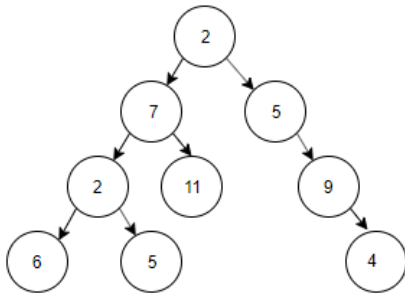
Choose the best answer:

1. The time complexity of insertion sort is _____.
a) $O(n^2)$ b) $O(n)$ c) $O(\log n)$ d) $O(1)$
2. _____ case indicates the minimum time required for program execution.
a) Best case b) Worst case c) Average case d) Null case
3. _____ linked list can be traversed in both forward and backward direction of a list.
a) circular b) singly c) two-way d) array
4. The unused memory cells in the arrays are linked together using _____ as its pointer variable.
a) LINK b) FRONT c) NEW d) AVAIL
5. If FRONT = 2 and REAR = 3 in a QUEUE of 4 elements, then _____ is the value of REAR if an element is added to the QUEUE.
a) 2 b) 1 c) 4 d) 0
6. $/+AB - CD$ is in _____ form of expression.
a) Postfix b) préfix c) infix d) nofix
7. A path ending in a leaf in tree data structure is called as _____.
a) node b) branch c) edge d) level
8. The value at node N is greater than or equal to the value at each of the children of N in _____.
a) min heap b) max heap c) minmax heap d) heap
9. _____ graph does not allow either multiple edges or loops.
a) planar b) multi c) simple d) pseudo
10. The number of edges in a simple, n-vertex, complete graph is _____.
a) $n*(n-2)$ b) $n*(n-1)$ c) $n*(n-1)/2$ d) $n/2$

Fill in the blanks:

11. _____ is an informal high-level description of a computer program or algorithm.
12. Arrays are _____ type of data structures.
13. _____ is a technique in which computer periodically collects all deleted spaces into free storage list.
14. In _____ header list the value of PTR is equal to START and not PTR = NULL.

15. In stack the TOP pointer variable denotes _____.
16. In recursion there must be a _____ criteria, for which the procedure does not call itself.
17. The nodes with no successors in a graph are called as _____.
18. _____ is the pre order traversal of below tree.



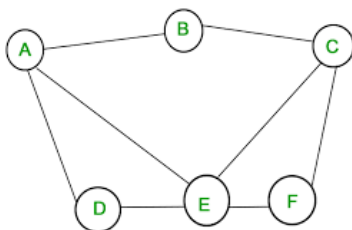
19. The sequential representation of graph in memory is given by _____.
20. A node is called as _____ in graph if it has zero indegree and positive outdegree.

SECTION – B

ANSWER ALL THE QUESTIONS:

(5 x 2 = 10)

21. Write the characteristics of an algorithm.
22. Write the overflow and underflow condition of a linked list.
23. What are the operations in queue?
24. What are the three properties of heap data structure?
25. Write the adjacency list of node A.



SECTION - C

ANSWER ANY EIGHT OF THE FOLLOWING:

(8 x 5 = 40)

26. Write a note on asymptotic notations.
27. Write the binary search algorithm and explain.
28. Explain with an algorithm, the insertion of an element at the beginning of the list using singly linked list.
29. Explain the insertion and deletion of an element in the list using array implementation.
30. Explain stack and its operations with suitable algorithms.

31. Write the Quicksort algorithm.
32. Explain binary search tree with examples.
33. Sort the following list using Heap sort algorithm: 23,12,7,54,38
34. Discuss on graph tree structure.
35. Write the breadth first graph traversal algorithm with example.

SECTION – D

ANSWER ANY THREE OF THE FOLLOWING:

(3 x 10 = 30)

36. Write and trace the bubble sort algorithm for the given elements :23,6,15,45.
37. Write the algorithm to insert an element using two –way linked list.
38. Illustrate the conversion of infix to postfix expression.
39. Write the algorithm and explain the in-order traversal in binary tree.
40. Explain the Shortest Path algorithm.
