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Reg. No. : .....

Code No. : 20098 E **Sub. Code : SMCS 33/ SMSE 33**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2023.

Third Semester

Computer Science / Software Engineering – Core

DATA STRUCTURE

(For those who joined in July 2017 – 2019)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. _____ is a finite set of instructions that accomplishes a particular task.
   (a) Algorithm
   (b) Program
   (c) Problem specification
   (d) Input

2. The _____ function produces a new, empty array of the appropriate size.
   (a) Create (j, list)
   (b) New (j, list)
   (c) Create Array (j, list)
   (d) New Array (j, list)

3. A stack is also known as
   (a) FIFO (b) FILO
   (c) LIFO (d) LILO

4. In _____, each node has exactly one pointer field.
   (a) Single linked list
   (b) Double linked list
   (c) Circular linked list
   (d) None of the above

5. The _____ of a tree is defined to be the maximum level of any node in the tree.
   (a) height (b) leaf
   (c) root (d) siblings

6. The height of a heap with n elements is
   (a) $\log_2(n)$ (b) $\log_2(n+1)$
   (c) $\log(n^2)$ (d) $\frac{\log_2(n)}{2}$

7. In directed graph on n vertices, the maximum number of edges
   (a) $\frac{n(n-1)}{2}$ (b) $n(n-1)$
   (c) $\frac{n(n+1)}{2}$ (d) $n(n+1)$

8. Kruskal's algorithm involves sorting of the edges, which takes _____ time.
   (a) o(e log e) (b) o(log e)
   (c) o(v log e) (d) o(e log v)

9. In insertion sort, the worst case insert make _____ comparisons before making the insertion.
   (a) i + 1 (b) i – 1
   (c) i^2 (d) 1^3

10. The loading density of a hash table is α = _____.
   (a) $n(sb)$ (b) $n/(sb)$
   (c) $\frac{sb}{n}$ (d) $\frac{s+b}{n}$

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Define algorithm. Listout and explain various characteristics of an algorithm.

Or

(b) How to represent a multidimensional array? Explain.

12. (a) Illustrate stack operation with example.

Or

(b) How to declare and use doubly linked list?

13. (a) Explain various properties of binary tree.

Or

(b) Write a short note on priority queue.

14. (a) Illustrate the adjacency list representation of graph.

Or

(b) Write a prim's algorithm. Explain.

15. (a) Explain insertion sort with example.

Or

(b) What you meant by Hash table? Explain.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss space complexity.

Or

(b) Analyze the time and space requirements of matrix multiplication.

17. (a) Write a function to evaluate postfix expression. Explain with example.

Or

(b) Explain in detail about linked list representation of sparse matrix.

18. (a) Describe binary tree traversals.

Or

(b) Explain the following operations on Binary search tree

(i) insertion

(ii) deletion.

19. (a) Briefly explain BFS and DFS with example.

Or

(b) Explain single source shortest path.

20. (a) Discuss merge sort with example.

Or

(b) Define Heap sort. How to adjust a max heap? Explain.

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