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Question Paper Code: 44824

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fourth Semester

Electrical and Electronics Engineering

14UIT424 - DATA STRUCTURES AND ALGORITHMS

(Common to EIE and ICE branches)

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. When overloading unary operators using Friend function, it requires _____ arguments.
(a) Zero (b) One (c) Two (d) Three
2. A Constructor that does not have any parameters is called _____ Constructor.
(a) Custom (b) Parameterized (c) Copy (d) Default
3. Class X, class Y and class Z are derived from class BASE. This is _____ inheritance.
(a) Multiple (b) Multilevel (c) Hierarchical (d) Single
4. Pick out the correct statement in function template
(a) One function will work with many different types
(b) it will take a long time to execute
(c) duplicate code is increased
(d) None of these
5. The complexity of Bubble sort algorithm is
(a) $O(n)$ (b) $O(\log n)$ (c) $O(n^2)$ (d) $O(n \log n)$

6. Linked lists are best suited
- (a) for relatively permanent collections of data
 - (b) for the size of the structure and the data in the structure are constantly changing
 - (c) for both of above situation
 - (d) none of these
7. Which algorithm is based on divide-and-conquer programming approach?
- (a) bubble sort
 - (b) selection sort
 - (c) merge sort
 - (d) shell sort
8. How many loops are there in Minimum Spanning Tree?
- (a) One
 - (b) Two
 - (c) Many
 - (d) None
9. The complexity of Bubble sort algorithm is
- (a) $O(n)$
 - (b) $O(\log n)$
 - (c) $O(n^2)$
 - (d) $O(n \log n)$
10. Which of the following algorithm design technique is used in the quick sort algorithm?
- (a) Dynamic programming
 - (b) Backtracking
 - (c) Divide and conquer
 - (d) Greedy method

PART - B (5 x 2 = 10 Marks)

11. List out the rules for defining operator overloading.
12. Write the syntax of pure virtual function.
13. Define Algorithm. List the characteristics of an algorithm.
14. How many nodes will be there in a minimum spanning Tree, if it is derived from a graph of n nodes? Justify your answer with a pictorial representation only.
15. Define Sorting. List out its types.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail (i) Tokens (ii) Functions in C++ and (iii) basic concepts in OOP. (16)

Or

- (b) What is dynamic initialization of objects? Why is it needed? How is it accomplished in C++? Illustrate. (16)

17. (a) Define Inheritance. Explain the types of inheritance in detail with example. (16)

Or

(b) Explain exception handing in detail with example programs. (16)

18. (a) (i) Let P be a pointer to a singly linked list. Show how this list may be used as a stack. That is, write algorithms to push and pop elements. Specify the value of P when the stack is empty. (8)

(ii) Define Hashing. How do collisions happen during hashing? Explain the different techniques resolving of collision. (8)

Or

(b) Write an ADT to implement stack of size N using an array. The elements in the stack are integers. The operations to be supported are PUSH, POP and DISPLAY. Taken into account the exceptions of stack overflow and stack underflow. (16)

19. (a) Write routines to implement the basic binary search tree operations with suitable examples. (16)

Or

(b) What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers.

45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48

Traverse the tree in Preorder, Inorder and Postorder. (16)

20. (a) Develop Heap sort , sort the given numbers 12, 56, 34, 78, 23 and write its routine. (16)

Or

(b) (i) Sort the following sequence of keys using merge sort:
66, 77, 11, 88, 99, 22, 33, 44, 55 (8)

(ii) Write an algorithm to sort a given list using quick sort method. Describe the behaviour of quick sort when input is already sorted. (8)

