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**Question Paper Code: 43223**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

Third Semester

Electronics and Communication Engineering

14UCS323 - DATA STRUCTURES AND ALGORITHM ANALYSIS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. For a method to be an interface between the outside world and a class, it has to be declared  
(a) Private            (b) Public            (c) Protected            (d) Static
2. In which case is it mandatory to provide a destructor in a class?  
(a) Almost in every class  
(b) Class for which two or more than two objects will be created  
(c) Class for which copy constructor is defined  
(d) Class whose objects will be created dynamically
3. Assume that we have constructor functions for both base class and derived class. Now consider the declaration in main( ). Base \* P = New Derived; in what sequence will the constructor be called  
(a) Derived class constructor followed by Base class constructor  
(b) Base class constructor followed by derived class constructor  
(c) Base class constructor will not be called  
(d) Base class constructor will not be called

4. \_\_\_\_\_ inheritance uses both multiple and multilevel inheritance
  - (a) Hierarchical
  - (b) Hybrid
  - (c) Single
  - (d) Multipath
5. A heap is a \_\_\_\_\_.
  - (a) Binary tree
  - (b) Full binary tree
  - (c) Complete binary tree
  - (d) Binary search tree
6. In the following which is open addressing hashing mechanism?
  - (a) Separate chaining
  - (b) Double hashing
  - (c) Rehashing
  - (d) Extensible hashing
7. Binary tree has  $N$  number of nodes with two children. How many leaf nodes are available in a tree?
  - (a)  $N+2$
  - (b)  $N!$
  - (c)  $N+1$
  - (d)  $\log N$
8. The classic example for NP-complete problem is
  - (a) Dijkstra's algorithm
  - (b) Floyd's algorithm
  - (c) Travelling salesman problem
  - (d) None of these
9. The complexity of multiplying two matrices of order  $m \times n$  and  $n \times p$  is
  - (a)  $mnp$
  - (b)  $mp$
  - (c)  $mn$
  - (d)  $np$
10. Which sorting technique is the successor of Bucket sort?
  - (a) Insertion sort
  - (b) Bubble sort
  - (c) Radix sort
  - (d) Quick sort

PART - B (5 x 2 = 10 Marks)

11. List the merits and demerits of the friend function.
12. Define virtual destructor.
13. What are the properties of the binary heaps?
14. Define minimum spanning tree.
15. Explain the performance analysis of the algorithm.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Explain the features of object oriented programming. Describe how each of these is implemented in C++. (8)
- (ii) Write a program to calculate the area of circle, triangle, and rectangle using function overloading. (8)

Or

- (b) Define constructor. Explain types of constructor with example in C++. (16)
17. (a) Explain protected data with private and public inheritance. (16)

Or

- b) (i) Write a program to implement the class template for Queue operations. (10)
- (ii) What is meant by exceptions? How an exception is handled in C++? Explain with the help of an example. (6)
18. (a) (i) Write a program to perform the operations of stack using array. (8)
- (ii) Write an algorithm to convert infix to postfix expression and explain it with an example. (8)

Or

- (b) (i) Write a procedure to insert a new node in binary heaps. (6)
- (ii) Given input {1, 64, 25, 16, 49, 4, 9.36, 81} and a hash function  $h(x) = x \pmod{10}$ , show the resulting: (i) open hash table (ii) closed hash table using linear probing (iii) closed hash table using quadratic probing (iv) closed hash table with second hash function  $h_2(x) = 7 - (x \pmod{7})$ . (10)
19. (a) (i) Write a program in C to create an empty binary search tree and search for an element X in it. (8)
- (ii) Explain in detail (i) Single rotation (ii) double rotation of an AVL tree. (8)

Or

- (b) Explain AVL tree with suitable example. (16)

20. (a) Write a program to arrange the set elements using merge sort. Apply the merge sorting algorithm for 8 2 9 4 5 3 1 6. (16)

Or

(b) (i) Which sorting algorithm is best suited for a partially sorted list? Give an example. (8)

(ii) How will you find the shortest path between every pair of vertices in a given graph? Give example. (8)