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**Question Paper Code: 41347**

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

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)

- The default access specifier for the classes is  
(a) Private      (b) Public      (c) Protected      (d) Static
- The following operator cannot be overloaded as a member function  
(a) [ ]      (b) ? :      (c) <<      (d) \*
- How can you achieve the runtime polymorphism?  
(a) Overloading      (b) Template      (c) Inheritance      (d) Virtual Function
- What is the return value of strcmp ("EEE", "ECE")?  
(a) 0      (b) -2      (c) 2      (d) garbage value
- What is the worst time complexity of binary search?  
(a) 1      (b)  $n$       (c)  $\log n$       (d)  $n \log n$
- In the following which is open addressing hashing mechanism?  
(a) Separate chaining      (b) Double hashing  
(c) Rehashing      (d) Extensible hashing
- 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 running time of the shell sort using Hibbard increment
- (a)  $N^2$                       (b)  $N^{3/2}$                       (c)  $N^3$                       (d)  $N^N$
10. Which of the following algorithm design technique is used for matrix multiplication?
- (a) Divide and Conquer                      (b) Dynamic Programming  
(c) Greedy algorithm                          (d) Backtracking

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. Draw the binary search tree for 6, 9, 3, 5, and 8.
15. Differentiate divide and conquer and dynamic programming.

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Discuss the various concepts of object oriented programming languages.                      (10)
- (ii) Write a program to calculate the area of circle, triangle, and rectangle using function overloading.                      (6)

Or

- (b) (i) Create the class Complex with its suitable properties. Write a C++ program to perform the overloaded operator functions for +, \*, /.                      (10)
- (ii) Discuss briefly about copy constructor.                      (6)
17. (a) Consider a publishing company that markets both book and audio cassette version to its works. Create a class Publication that stores the title (a string) and price (type float) of a publication. Derive the following two classes from the above Publication class: Book which adds a page count (int) and Tape which adds a playing time in minutes (float). Each class should have get\_data() function to get its data from the user at the keyboard. Write the main() function to test the Book and Tape classes by creating instances of them asking the user to fill in data with get\_data() and then displaying it using put\_data().                      (16)

Or

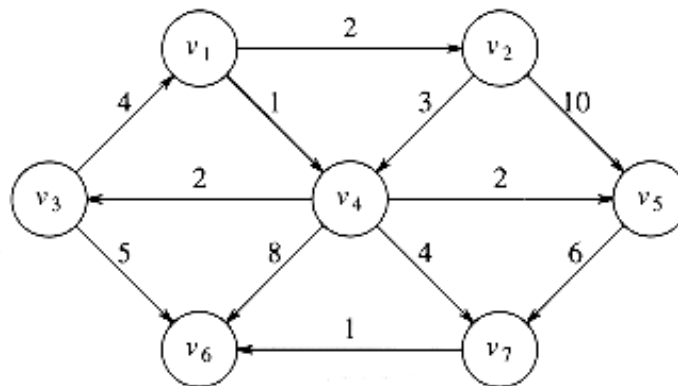
- (b) (i) Write a program to implement the class template for Queue operations. (10)
- (ii) What is meant by exceptions? How an exception is handled in C++? Explain with the help of an example. (6)
18. (a) (i) Write a program to insert the new node in ascending ordered single linked list. (8)
- (ii) 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  $h_2(x) = 7 - (x \pmod{7})$ . (8)
19. (a) (i) Write a program to insert and delete the elements in a binary search tree. (10)
- (ii) Discuss briefly about binary tree traversals. (6)

Or

- (b) (i) Find the shortest path from the source node V1 to all other vertices.



- (10)
- (ii) Discuss briefly about topological sorting. (6)
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) What is greedy algorithm and its elements. Explain how the greedy approach is adopted for minimum spanning tree algorithms. (16)
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