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**Question Paper Code: 53826**

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

Third Semester

Electronics and Communication Engineering

15UIT326-DATA STRUCTURES AND ALGORITHM ANALYSIS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. When one object reference variable is assigned to another object reference variable then CO1- R
  - (a) a copy of the object is created.
  - (b) a copy of the reference is created.
  - (c) a copy of the reference is not created.
  - (d) it is illegal to assign one object reference variable to another object reference variable
2. Which of the following is not correct for virtual function in C++? CO2- R
  - (a) Must be declared in public section of class
  - (b) Virtual function can be static
  - (c) Virtual function should be accessed using pointers
  - (d) Virtual function is defined in base class
3. The result evaluating the postfix expression  $10\ 5\ +\ 60\ 6\ /\ * 8 -$  is CO3- App
  - (a) 284
  - (b) 213
  - (c) 142
  - (d) 71
4. The height of a binary tree is the maximum number of edges in any root to leaf path. The maximum number of nodes in a binary tree of height h is: CO4- U
  - (a)  $2^h - 1$
  - (b)  $2^{(h-1)} - 1$
  - (c)  $2^{(h+1)} - 1$
  - (d)  $2 * (h+1)$

5. If the array is already sorted, then the running time for merge sort is: CO5- R  
 (a)  $O(1)$                       (b)  $O(n \cdot \log n)$                       (c)  $O(n)$                       (d)  $O(n^2)$

PART – B (5 x 3= 15 Marks)

6. Illustrate the various control structures used in C++. CO1- R  
 7. Explain about how to declare pointer and perform arithmetic with an example. CO2-U  
 8. Write a routine to implement stack operations using array. CO3-App  
 9. Explain double rotation in AVL tree with an example. CO4-U  
 10. Write the algorithm for insertion sort. CO5-U

PART – C (5 x 16= 80 Marks)

11. (a) Specify a class called complex to represent complex numbers. CO1- U      (16)  
 Overload +, -, \*and / operators when working on the objects of this class.

Or

- (b) Write a C++ program to apply the basic concepts of OOPs with diagrammatic illustration. CO1- U      (16)

12. (a) Write a C++ program to define a class called patient(name, age, sex). Derive two classes from patient namely in-patient(ipno, date-of-admission, date-of-discharge) and out-patient (opno, doctor-id and consultation-fee). Define two classes namely general-ward(rent/day) and special-ward(roomno, rent/day, eb-bill). For out-patient print the bill with consultation fee. For in-patients, print bill according to their accommodation either in general-ward or special-ward. CO2- Ana      (16)

Or

- (b) (i) Write a program to maintain employee details using files. CO2- Ana      (10)  
 Arrange the file in descending order of their salary.  
 (ii) Explain the concept of multiple catch statements in exception handling. CO2- Ana      (6)

13. (a) Given two sorted lists, L1 and L2, write procedure to compute  $L1 \cup L2$  and  $L1 \cap L2$  using only the basic list operations. CO3- Ana      (16)

Or

(b) Given the input (5, 29, 20, 0, 27, 18) and a hash function  $h(k) = k \% 9$  CO3- Ana (16)

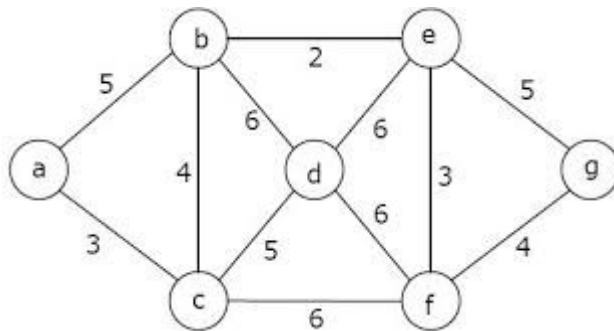
show the result of

- (i) Separate Chaining hash table
- (ii) Open addressing hash table using linear probing
- (iii) Open addressing hash table using quadratic Probing
- (iv) Open addressing hash table with second hash function  $h_2(k)$

14. (a) Write an insertion and deletion algorithm for binary search tree. CO4- App (16)  
 Insert 17,21,13,15,10,16,4,24,27,23,11,25,26 into a initially empty binary search tree. Delete 4, 10, 27 and 13 from the tree.

Or

(b) Explain Prim's algorithm. Construct the minimum spanning tree CO4- App (16)  
 for the following graph



15. (a) Write an algorithm to sort a set of 'N' numbers using Quick sort CO5- App (16)  
 .Trace the algorithm for the following numbers : 2, 13, 45, 56, 27, 18, 24, 30, 87 and 9

Or

(b) Explain how all pairs shortest path algorithm is solved using CO5- App (16)  
 dynamic programming?

