

Tribhuvan University
Institute of Science and Technology
2083
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Bachelor Level / Second Year/ Third Semester/ Science
Computer Science and Information Technology (CSC 211)
(Data Structure and Algorithms)
(NEW COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Section A

Attempt any TWO questions.

(2 × 10 = 20)

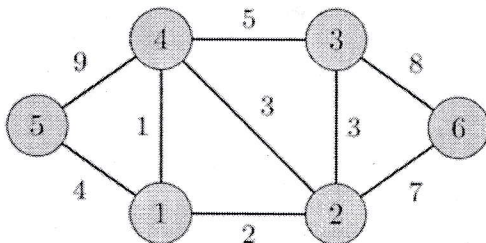
1. Differentiate between singly, doubly and circular linked list. How do you insert a new element at the beginning, at the specified position and at the end of doubly linked list? Explain. [3 + 7]
2. Is bubble sort internal sort or external sort? Give reason. Apply Quick sort on the data set {12, 7, 9, 24, 8, 2, -8, 11, 4, 3, 14, 5, 6, -6} to keep them in ascending order. [2 + 8]
3. When does the binary search algorithm perform the worst case? Assume the size of hash table be 7 and the hash function as $h(k) = k \text{ MOD } 7$. Now resolve the collisions using Linear probing, Quadratic probing and Double hashing while inserting the elements 17, 8, 24, 11, 15. [2 + 8]

Section B

Attempt any EIGHT questions.

(8 × 5 = 40)

4. Differentiate between ADT and data structure. Why do we always do worst case analysis of an algorithm? Justify. [2 + 3]
5. Convert $X + Y \times Z - (A / B)$ to postfix using stack. [5]
6. Assume a circular queue of size 5 and then enqueue 4, 9, 5 and then dequeue two elements and enqueue 11. [5]
7. When do we prefer tail recursion? Demonstrate a program to find the factorial value of given positive integer using tail recursion. [1 + 4]
8. How do you measure efficiency of a sorting algorithm? How do you create a node for circular linked list? [2.5 + 2.5]
9. What is the problem with binary search tree? List the primitive operations on queue. [2 + 3]
10. Create an AVL tree for the data {35, 15, 5, 20, 25}. [5]
11. Find the minimum spanning tree of following graph using Prims algorithm. [5]



12. Write the algorithm for merge sort. [5]