

CSE2011 Data Structure and Algorithms

DIGITAL ASSIGNMENT -

VL2020210507473	A2+TA2
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Instruction *Check VTOP for Submission date*

Note : Make use of Internet facility to learn about these algorithms

The implementation of the problem to be uploaded in the given date. ZERO mark will be awarded for late submission.

1. The document in the form of pdf to be uploaded.
2. The document should consist of i) 'Pseudocode', ii) 'C CODE' with iii) screen shot of Sample output.
3. Each Question has TWO(A&B) subdivision to be implemented
4. Marks will be reduced if the output is not clear.
5. **YourQuestionNumber = Last 4 Digits Of YourRegisterNumber % 10**
Example : 20BCE0244 -> your question is 0244 %10 = 4

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0. A) Using the following problem to prove that data compression using variable length code is better than fixed length code. Generate the Huffman code using the below given variable length code. Write an C program to implement Huffman code generation.

Fixed Length code

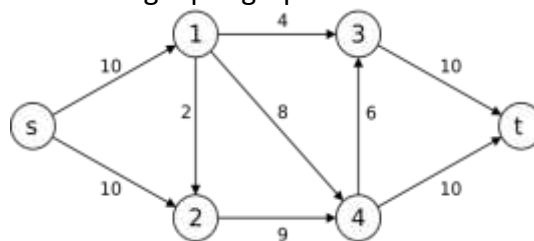
Character	a	e	i	u	k
Fixed length	111	000	101	100	011
Frequency	20	53	25	32	28

Variable Length code

Character	a	e	i	u	k
variable length	1	1001	11001	01011	1010
Frequency	20	53	25	32	28

- B) In Reverse Delete algorithm for Minimum spanning tree, sort all edges in **decreasing** order of their weights. After sorting, one by one pick edges in decreasing order. Then **include current picked edge and check if excluding current edge causes disconnection in current graph**. The main idea is delete edge if its deletion does not lead to disconnection of graph. Implement C source code check your answer for the given problem.

1. A) Using dynamic programming solve the problem with dimension $\langle 7, 9, 12, 8, 6 \rangle$ using Matrix chain multiplication. Write C program to implement the matrix chain multiplication.
 B) Write a C code to implement (Trace out) **SSS*** : state space search traversing a game tree in a best-first fashion.
2. A) Dinic's algorithm for Maximum Flow: Given a graph which represents a flow network where every edge has a capacity. Also given two vertices source 's' and sink 't' in the graph, find the maximum possible flow from s to t with following constraints :
 1. Flow on an edge doesn't exceed the given capacity of the edge.
 2. Incoming flow is equal to outgoing flow for every vertex except s and t.
 For example in the following input graph the Maximum s-t flow is 19 .



Implement the above algorithm in C to solve the above problem.

B) Illustrate with example (Trace out) Fibonacci search technique: search a sorted sequence using a divide and conquer algorithm that narrows down possible locations with the aid of Fibonacci numbers. Write a C code to implement the Fibonacci search technique Algorithm.

3. A) Ukkonen's algorithm is a linear-time, online algorithm for constructing suffix trees. Write a C program for the Algorithm.
 B) A ternary search tree is a type of trie (sometimes called a *prefix tree*) where nodes are arranged in a manner similar to a binary search tree, but with up to three children rather than the binary tree's limit of two. Like other prefix trees, a ternary search tree can be used as an associative map structure with the ability for incremental string search. Write a C code to implement the insertion and deletion for above search algorithm.
4. A) Branch and bound algorithm consists of a systematic enumeration of candidate solutions by means of state space search: the set of candidate solutions is thought of as forming a rooted tree with the full set at the root. The algorithm explores *branches* of this tree, which represent subsets of the solution set. Before enumerating the candidate solutions of a branch, the branch is checked against upper and lower estimated *bounds* on the optimal solution, and is discarded if it cannot produce a better solution than the best one found so far by the algorithm. Write a C program to implement the Branch and Bound algorithm.
 B) Write a C program to Implement Cohen–Sutherland line clipping Algorithm.

5. A) Write a C Program to implement the stable marriage problem (also stable matching problem or SMP). This problem is used in finding a stable matching between two equally sized sets of elements given an ordering of preferences for each element.
B) Write a C code to implement the ant colony optimization algorithm (ACO) is a probabilistic technique for solving computational problems which can be reduced to finding good paths through graphs.
6. A) The Bee's algorithm is a population-based search algorithm. It mimics the food foraging behaviour of honey bee colonies. In its basic version the algorithm performs a kind of neighbourhood search combined with global search, and can be used for both combinatorial optimization and continuous optimization. Write a C program to implement the Bee's Algorithm.
B) Dixon's factorization method (also Dixon's random squares method or Dixon's algorithm) is a general-purpose integer factorization algorithm; it is the prototypical factor base method. Write a C code implement the Dixon's Algorithm.
7. A) The Boyer–Moore string-search algorithm is an efficient string-searching algorithm that is the standard benchmark for practical string-search literature. Write a C code to implement the Boyer-Moore Algorithm.
B) Petrick's method (also known as *Petrick function* or *branch-and-bound* method) is a technique described for determining all minimum sum-of-products solutions from a prime implicant chart. Write a C program to implement the above method.
8. A) PageRank (PR) is an algorithm used by Google Search to rank web pages in their search engine results. PageRank is a way of measuring the Importance of website pages. Write a C Program to implement the above.
B) The shoelace formula or shoelace algorithm (also known as Gauss's area formula and the surveyor's formula) is a mathematical algorithm to determine the area of a simple polygon whose vertices are described by their Cartesian coordinates. Write a C program to implement the Shoelace Algorithm.
9. A) The bitap algorithm (also known as the shift-or, shift-and or Baeza-Yates–Gonnet algorithm) is an approximate string matching algorithm. The algorithm tells whether a given text contains a substring which is "approximately equal" to a given pattern, where approximate equality is defined in terms of Levenshtein distance – if the substring and pattern are within a given distance k of each other, then the algorithm considers them equal. Write a C code to implement this algorithm.
B) A trie, also called digital tree or prefix tree, is a type of search tree, a tree data structure used for locating specific keys from within a set. These keys are most often strings, with links between nodes defined not by the entire key, but by individual characters. In order to access a key (to recover its value, change it, or remove it), the trie is traversed depth-first, following the links between nodes, which represent each character in the key. Write a C code to implement this Algorithm.

