Department of Computer Science and Engineering
Institute of Technical Education & Research, SOA Deemed To Be University

End-Semester Lab. Examination, July-2022

Algorithm Design-2 (CSE 4131)

Semester: 4th
Full mark: 15

Branch: CSE, CS&IT
Time: 90 Mins.

All questions are compulsory.

Q1. Give the Java/C/C++/Python code implementation of the following problem. 5
0/1 Knapsack using Dynamic Programming.

Q2. Using backtracking, let us generate all possible subsets of a given set S = {3,6,8}, using the code given in section-7.1.2 of book (i.e. The Algorithm Design Manual by Steven S. Skiena. In how many number of steps the subset {6, 8} will be generated and in that step what are the contents of k and c[i]? And also define all the functions which are used in the skeleton. (Refer to the code below) 5

```
generate_subsets(int n){
    backtrack(a[],0,n);
}
backtrack(int a[],int k,int n) {
    if(is_a_solution(a[],k,n))
        process_solution(a[],k,n);
    else {
        k = k+1;
        construct_candidates(a[],k,n,c,&nc);
        for(i=0; i<nc; i++) {
            a[k] = c[i];
            make_move(a[],k,n);
            backtrack(a[],k,n);
            unmake_move(a[],k,n);
            if(finished) return; // finished = FALSE
        }
    }
}
```

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Q3. Given an M × N matrix of characters, find all occurrences of a given string in the matrix. We are allowed to search the string in all eight possible directions, i.e., North, West, South, East, North-East, North-West, South-East, South-West. Note that there should not be any cycles in the output path.

****End of Questions****

Instructions:

The evaluation will be done in the following ways:

- Correct implementation with satisfactory response to on-spot questions: 5 / 5
- Correct implementation with unsatisfactory response to on-spot questions: 3 / 5
- Incorrect/partial (min. 80%) implementation with satisfactory response to on-spot questions: 3 / 5
- Incorrect/partial (min. 80%) implementation with unsatisfactory response to on-spot questions: 2 / 5
- No implementation with satisfactory response: 1.5 / 5
- No implementation with unsatisfactory response: 0.5 / 5
- *Plagiarized code:* -2.5 / 5