**CSE 462 (Offline 2)**

**Weighted Set Cover Problem**

**Goal:**

Get clear idea of,

* Exact Algorithm using Bitmask Dynamic Programming Technique.
* Problem formulation using Integer Programming.
* Approximation using Linear Programming.
* Deterministic Rounding Technique.

**Task:**

1. Bitmask DP Approach (Follow Lecture 10)
2. LP Approximation Approach (Follow Lecture 04)

**Input Format:**

First line contains T, number of test cases.  
Following lines contain test cases in following format

* N, number of elements in the parent set( let X ), that needed to be covered
* M, number of subset (Let S0 S1  ....  SN-1). [S0 U S1 U .... U SN-1 = X condition should hold ]
* Then M lines contains information of M subsets in format
  + Wi Ki e0 e1 e2 ..... ek-1
  + Wi is cost of the subset
  + Ki is size of the subset, ei0 ei1 ei2 ..... eik-1 are elements of that subset Si

\*\*\*A sample test file is attached with the offline. This is applicable to test compatibility of your source code. **DO NOT SUBMIT THIS FILE AS YOUR OWN TEST CASE.**

**Output Format:**

IDs of the subset you are taking to cover the parent set. And the minimum total cost you are paying to cover the parent set.

**Marks Distribution:**

|  |  |
| --- | --- |
| **Task** | **Marks** |
| Coding (Java/cpp object oriented code) | 5+6 |
| Test Case Design | 3 |
| Complexity analysis, Chart & Graph (XLSX format) | 4 |
| Viva | 2 |

**Chart & Graph:**

Same as offline 1. Run same set of case for exact & approximate approach. Make chart of runtime & approximation ratio.

**File Submission Format:**

Make a folder named "offline\_2\_1205\*\*\*”. Every file you submit must have your student id as a substring (1205\*\*\*\_approx.cpp )  
You have to submit all codes, test cases and xlsx files.

**Submission Deadline:**

April 9, 11.55 pm.

You have to show the very same file during assessment. **DON’T COPY FROM OTHERS.**