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) LP Approximation Approach
2) Bitmask DP Approach

**** Assign costs/ weights arbitrarily: both of uniform and non-uniform versions of set cover problem.*

Input Format: (in a ".txt" formatted file)

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 S_0 S_1 .... S_{M-1}). [S_0 U S_1 U .... U S_{M-1} = X condition should hold]
- Then M lines contains information of M subsets in format
  - W_i K_i e_0 e_1 e_2 ..... e_{k-1}
  - W_i is cost of the subset
  - K_i is size of the subset, ei_0 ei_1 ei_2 ..... ei_{k-1} are elements of that subset S_i

***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)	6+6
Test Case Design	2
Complexity analysis, Chart & Graph (XLSX format)	2+2

Proper submission	2

Chart & Graph:

Run same set of case for both LP & bitmask DP approach. Make chart of runtime & approximation ratio.

File Submission Format:

Make a folder named "offline_2_1305***". Every file you submit must have your student id as a substring (1305***_LP.cpp, 1305***_DP.cpp).
If you work with Java, then submit the zipped file of the Java project containing your student id (e.g., 1305***_LP.zip, 1305***_DP.zip).

You have to submit all codes, test cases and xlsx files.