Attributes	Complex Problems
Preamble	Engineering problems which cannot be resolved without in-depth engineering knowledge and having some or all of the following characteristics:
Range of conflicting requirements	Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Depth of knowledge required	Requires in-depth knowledge that allows a fundamentals-based first principles analytical approach
Familiarity of issues	Involve infrequently encountered issues
Level of problem	Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder involvement and level of conflicting requirements	Involve diverse groups of stakeholders with widely varying needs
Consequences	Have significant consequences in a range of contexts
Interdependence	Are high level problems possibly including many component parts or sub-problems

Subject:	**Complex Engineering Problem**
Class:	**Object Oriented Programming (CS-212)**
Issue date:	**S-III (EE)**
Submission Date:	**10 November 2022**
	10 December 2022

Faculty Name	Assignment #	CLO	PLO	BT Level	Marks
M. Samiullah Awan	3	2	3	C3	20

I. CEP statement:

As children, we loved word games. So, let's do those interesting things again. In this assignment, you'll implement a word game. While doing this implementation you will use all programming constructs learned in the class till now.

II. Problem definition:

This game is just like a scrabble game.

- First, user is asked to enter number of letters allowed to make word e.g., n
- Then user will be prompted to enter n different letters along with score (1-9) assigned to each letter.
- User will construct one word out of these letters. Each valid word receives a score.
- Score for a word is the sum of the points for letters in the word, plus 50 points if all n letters are used on the first go.

Program must have following checks:

- Number of allowed letters should not exceed 15 and should not be less than 3.
- Score assigned to each letter should not be negative or zero and should be less than 10.
- Program should display zero score if word constructed by user has any letter other than allowed list.
- User should be asked if he/she wants to play game again.
- If user enters a number in place of allowed letter loop should immediately terminate with the message "invalid letter".

III. Analysis of the problem:

This whole task can be divided into many small sub tasks:

- **Setting letter tiles and scores:**

In this task user will not only define range of allowed letters to make word but he/she will also enter random letters and their scores. After this task initial grid of letters is available to user and now, he/she can make words.

• **Constructing word:**

User will use allowed letter grid to make meaningful words. While constructing words user will have to keep all game rules in mind.

• **Checking validity of word:**

In this phase program will check for validity of word by checking all set constraints. Program will display

a message to user after check and will prompt user to play more.

IV. Evaluation:

Students will be evaluated on the following criteria:

• Implementation: 70%

• Output/result achieved: 30%

Summary:

Following are salient outcomes of this assignment in terms of complex engineering problem:

• Brainstorming exercise forced them to explore the surrounding environment to sort out the problems using programming constructs.

• Implementation gave them a chance to go through the in-depth engineering knowledge to solve the problem and analyze in an effective way.

Note: Please design the code with results for any one from above objectives. It is open to use any suitable libraries.