**Assignment**

**Grading System/ CGPA Calculation:**

Professor Thomas wants to have a system that can calculate the CGPA of a student. Below is a sample about how CGPA is calculated.

**Example:** Different marks, same subject, with the same credits but different grades

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Subject** | **Marks** | **Grade** | **Credits** | **Grade Points** | **Grade Score** |
| 1 | Mathematics | 90-100 | A+ | 4 | 5 | 4\*5=20 |
| 2 | Mathematics | 80-90 | A | 4 | 4 | 4\*4=16 |
| 3 | Mathematics | 70-80 | B+ | 4 | 3 | 4\*3=12 |

**Marks and Grades are allocated as below:**

|  |  |  |
| --- | --- | --- |
| **Marks range** | **Grade** | **Grade Points** |
| 90-100 | A+ | 5 |
| 80-90 | A | 4 |
| 70-80 | B+ | 3 |
| 55-70 | B | 2 |
| 40\*-55 | C | 1.5 |

No grade will be allocated below the minimum threshold, here it’s 40.

Code must be dynamic/parametrized in such a way that:

1. User defines grade points and marks range for each grade.
   1. For example: If a user wants, he defines “**A+**” for marks range as 95-100, “**A”** for 85-90 and so on. Also, Grade points may be changed by the user as “**A+**” as 6 points, “**A**” as 5 points, etc.
2. User can define a minimum threshold as per requirement, in the above example it’s 40, but no grade will be allocated if marks are below that threshold.
3. If for a subject marking scheme is not defined, display the message as “Please define marking scheme for subject: <subject name>”
4. User will enter marking scheme first, then he will pass student details
5. User must be able to pass bulk data via any external file, for defining marking scheme and pass student details in bulk for getting grade points

**Sample marking scheme file:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Subject** | **Marks range** | **Grade** | **Grade Points** | **Credits** | **Minimum Threshold/marks** |
| 1. | Mathematics | 80-90 | A | 5 | 4 | 35 |
| 2 | Physics | 70-80 | B+ | 4 | 3 | 40 |

1. If the user passes student details in Bulk via file, then output must also be written in a file as below:

**Student grades file:**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Student Name** | **Subject** | **Marks** | **Eligible for Grade** | **Grade** | **Subject credits** | **Grade Final Points** |
| 1 | Pete | Mathematics | 80 | Yes | A | 5 | 20 |
| 2 | Sam | Mathematics | 35 | No | No | 5 | 0 |

\*If there’s no marking scheme defined for a subject, then it must not come in the student grades file.

1. If for any Subject, there’s a range for which the user has not defined any grade and minimum marks in that range are more than a threshold, then display an error message while process file as:

\*Please define grades for range: <missing range> for subject <subject name> in file. Also, do not process the file.

1. If minimum marks/thresholds are not present in the file, then also display an error message as:

\*Please define minimum marks <minimum marks> for subject <subject name> in file. Also, do not process the file.

**Assumptions/Considerations:**

1. Store data in an Excel file/DB, pass Excel file as input and get output in Excel
2. Cover all the corner cases, scenarios regarding invalid input, file processing, characters
3. The code must be executable on any machine