PART B **[30 MARKS]**

Ministry of Transport Malaysia is required to prepare a report of the total road accidents by states in Malaysia from the year, 2006 to 2015.

INSTRUCTIONS:

Write a C++ program to calculate the average number of road accidents for each state and find the highest number of road accidents from 2006 to 2015. Your program should be able to do the following tasks:

(a) The program should use the following **`struct`** definition:

```
struct dataAcc
{
   int numAcc[10]; //number of road accidents from 2006-2015
   string state; //states in Malaysia
   float avg; //average number of road accidents for 2006-2015
}
```

(b) The program should use an array of **`struct`** defined in (a) to store the total road accidents by states in Malaysia from 2006 to 2015.

(c) The program will read input data from an input file named "input.txt" into the array of **`struct`** declared in (b). Example of input data in "input.txt" is shown in **Figure 2**.

(d) The program should have two (2) global constants and one (1) global variable as follows:

Global contants:

NUM_STATE = 14 ⇨ Number of states

NUM_YEAR = 10 ⇨ Number of years

Global variable:

out ⇨ Variable to point to output file named "output.txt"

(e) Besides the function **`main()`**, the program has three (3) other functions as described in **Table 2**. One of the functions is given below:

```
void displayLine()
{
   for (int i = 0; i < 98; i++)
```

```
        out << "-";
    out << endl;
}
```

Based on the description given in **Table 2**, the program needs to define two (2) more functions. You should use appropriate argument(s) (if necessary) for each function.

Table 2: Description of functions

Function	Description
`displayLine()`	To display lines using 98 characters of '-' in the output file using a loop.
`cal_Avg()`	To calculate the average number of road accidents for each state. The function should accept a 1D array of the number of road accidents for 10 years for each state as its argument. The function should return the average number of road accidents for each state.
`find_HighLow()`	To find and display the highest number of road accidents from 2006 to 2015. The function should accept a 1D array of structures as its argument.

(f) The program needs to display the following information. **Figure 3** shows the output of the successful program.

- Name of state.
- Number of road accidents for 2006-2015 in each state.
- Average number of road accidents for 10 years in each state.
- The highest number of road accidents for 10 years with the name of state and year.

The assessment criteria are shown in **Table 3**.

```
1160 1364 1417 1633 1548 1791 1881 1895 1888 1861 PERLIS
15505 16172 16520 17701 17966 19699 19935 20228 20159 22016 KEDAH
32573 33881 34049 33719 34306 37158 37851 39361 38747 39856 PULAU PINANG
27432 29203 30539 32327 32072 33506 34714 35408 35131 36736 PERAK
92632 99157 100380 107429 115565 128876 129106 135024 137809 140957 SELANGOR
46254 49454 48671 51942 53493 58795 61872 64527 63535 64664 KUALA LUMPUR
15197 16079 17362 18369 19407 21157 22146 23066 23748 22939 NEGERI SEMBILAN
10707 11720 12105 13275 14110 14720 15195 16083 16375 17069 MELAKA
43757 46584 48667 51747 55381 59501 62316 64600 64473 67112 JOHOR
13242 13982 15629 17068 17315 19001 20554 20130 19071 19635 PAHANG
7337 8116 8842 9549 9707 9603 9968 9748 10326 9960 KELANTAN
7098 8155 8814 10118 10106 10684 10861 10996 9383 10381 TERENGGANU
13550 14256 14588 15798 16192 16585 17446 17438 17858 17290 SABAH
14808 15196 15488 16655 17253 17964 18578 18700 17693 19130 SARAWAK
```

Figure 2: Input file named "**`input.txt`**"

```
-------------------------------------------------------------------------------------------------
     STATE          2006   2007   2008   2009   2010   2011   2012   2013   2014   2015   AVERAGE
-------------------------------------------------------------------------------------------------
 PERLIS             1160   1364   1417   1633   1548   1791   1881   1895   1888   1861    1643.8
 KEDAH             15505  16172  16520  17701  17966  19699  19935  20228  20159  22016   18590.1
 PULAU PINANG      32573  33881  34049  33719  34306  37158  37851  39361  38747  39856   36150.1
 PERAK             27432  29203  30539  32327  32072  33506  34714  35408  35131  36736   32706.8
 SELANGOR          92632  99157 100380 107429 115565 128876 129106 135024 137809 140957  118693.5
 KUALA LUMPUR      46254  49454  48671  51942  53493  58795  61872  64527  63535  64664   56320.7
 NEGERI SEMBILAN   15197  16079  17362  18369  19407  21157  22146  23066  23748  22939   19947.0
 MELAKA            10707  11720  12105  13275  14110  14720  15195  16083  16375  17069   14135.9
 JOHOR             43757  46584  48667  51747  55381  59501  62316  64600  64473  67112   56413.8
 PAHANG            13242  13982  15629  17068  17315  19001  20554  20130  19071  19635   17562.7
 KELANTAN           7337   8116   8842   9549   9707   9603   9968   9748  10326   9960    9315.6
 TERENGGANU         7098   8155   8814  10118  10106  10684  10861  10996   9383  10381    9659.6
 SABAH             13550  14256  14588  15798  16192  16585  17446  17438  17858  17290   16100.1
 SARAWAK           14808  15196  15488  16655  17253  17964  18578  18700  17693  19130   17146.5
-------------------------------------------------------------------------------------------------
The highest number of road accidents = 140957 at SELANGOR on 2015
-------------------------------------------------------------------------------------------------
```

Figure 3: Example output in output file named "**`output.txt`**"

Table 3: Assessment criteria

Item	Criteria	Marks
A	Using an appropriate structure for the program (*e.g*. all required header files are included, the function main is properly written, *etc*.).	3
B	Define a global constants, global variable and array of structures	2
	Reading the input data from input file.	4
C	Definition of function **`cal_Avg()`**.	4
	Definition of function **`find_HighLow()`**.	7
D	Printing the output as requested in (f), Figure 3 and in a proper format.	10
Total		**30**