Program list for CSE1011/CSE1012

A. Preliminary

1. Write a program to print "**Hellow World !** ".
2. Write a program to take input from keyboard.
3. The length and height of a rectangle and radius of a circle are input through the keyboard. Write a program to find the area & perimeter of the rectangle and the area & circumference of the circle.
4. Rahim's basic salary is input through the keyboard. His House rent allowance is 30% of basic salary and medical allowance is 5% of basic salary. He gets extra 1000 tk as technical allowance. Write a program to calculate his gross salary and print the result.
5. The distance between AUST main campus and Rajshahi campus (in km) is input through keyboard. Write a program to convert and print this distance in meters, feet, inches and centimeters.
6. Temperature of a city in Fahrenheit degrees is input through the keyboard. Write a program to convert this temperature into centigrade degrees.
7. Two numbers are input through the keyboard into two locations A and B. Write a program to interchange the contents of A and B.
8. If marks obtained by a student in 5 different subjects are input from keyboard, find out the aggregate marks and percentage marks obtained by the student.
9. If a 5 digit number is input through the keyboard, write a program to calculate and print the sum of its digits.
   [Hint: Use the modulus operator '%']
10. If a 5 digit number is input through the keyboard, write a program to reverse the number.
11. If a 4 digit number is input through the keyboard, write a program to obtain the sum of the first and last digit of this number.

B. Conditional

1. Three numbers are input through keyboard. Write a program to find out the **maximum** and **minimum** of these 3 numbers.
2. Take a year as input and determine whether it is a **leap year**.
   [Hint: Check the divisibility by 4, 100 and 400]
3. If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit he made or loss he incurred.
4. Any integer is input through keyboard. Write a program to find out whether it is an **odd number** or **even number**.
5. According to Gregorian calendar, it was Monday on the date 01/01/1900. If any year is input through the keyboard write a program to find out what is the day on 1st January of this year.
6. A five digit number is entered through the keyboard. Write a program to obtain the reverse number and to determine whether the original numbers are equal or not.

7. AUST grading policy is :
    (i) 80 % marks or above is A+
    (ii) 75% to 79% marks is A
    (iii) 70% to 74% marks is A-
    (iv) 65% to 69% marks is B+
    (v) 60% to 64% marks is B
    (vi) 55% to 59% marks is B-
    (vii) 50% to 54% marks is C+
    (viii) 45% to 49% marks is C
    (ix) 40% to 44% marks is D
    (x) Below 40% is F

   Write a program which will take an input from user and calculate the grade of a student according to AUST grading policy based on that input.
8. A certain grade of steel is graded according to the following conditions:
    (i) Hardness must be greater than 60
    (ii) Carbon content must be less than 0.7
    (iii)Tensile strength must be greater than 5000

   The grades are as follows:
   Grade is 10 if all three conditions are met
   Grade is 9 if condition (i) and (ii) are met
   Grade is 8 if condition (ii) and (iii) are met
   Grade is 7 if condition (i) and (iii) are met
   Grade is 6 if only one condition is met
   Grade is 5 if none of the conditions are met

   Write a program which will require the user to give values of hardness, carbon content and tensile strength of the steel under consideration and output the grade of the steel.

C. Lopping

1. **x** and **n** are input through keyboard. Write a program to compute $\mathbf{x^n}$, **n!** , $\mathbf{{}^nC_r}$, $\mathbf{{}^nP_r}$
2. Write a program to determine the **GCD** (greatest common divisor) and **LCM** (least common multiple) of 3 numbers.
3. Find out the sum of each of the following series. n is the input from user for series (iv) to (vi)
    (i) 3 + 11 + 19 + … + 1691.
    (ii) 7 + 20 + 33 + … (up to 100 th term)
    (iii) 5 – 11 + 17 - … (up to 75 th term)
    (iv) 1 + (1 + 2) + (1 + 2 + 3) + … + (1 + 2 + 3 + … + n)
    (v) $1 + \frac{2^2}{2!} + \frac{3^2}{3!} + \ldots + \frac{n^2}{n!}$
    (vi) 2 * 7 * 12 * … * 37
4. Write a program to determine all **prime numbers** within the range **[a …b]** where **a** & **b** are input through keyboard.
5. Construct the following table. Here **n** is input from the user.

1	2	3	…	n
2	4	6	…	2n

3	6	9	…	3n
.	.	.	…	.
.	.	.	…	.
.	.	.	…	.
n	2n	3n	…	nn

6. Write a program to find out first n **perfect number** where **n** is the input from user.
7. Write a program to find first n **Fibonacci number** where **n** is the input from user.
8. Write a program to show the following triangle/rectangle of '*'s or numbers. Take **n** as input from user to determine the number of rows of the structure. (eg: n = 5)

```
        *
      * * *
    * * * * *
  * * * * * * *
* * * * * * * * *

        *
      *   *
    *       *
  *           *
* * * * * * * * *

        1
      1 2 1
    1 2 3 2 1
  1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1

* * * * *
* * * * *
* * * * *
* * * * *
* * * * *

* * * * *
*       *
*       *
*       *
* * * * *

1 2 3 2 1
1       1
1       1
```

```
1       1
1 2 3 2 1
```

```
        *
      * * *
    * * * * *
  * * * * * * *
* * * * * * * * *
  * * * * * * *
    * * * * *
      * * *
        *
```

```
        *
      *   *
    *       *
  *           *
*               *
  *           *
    *       *
      *   *
        *
```

```
        1
      1 2 1
    1 2 3 2 1
  1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
  1 2 3 4 3 2 1
    1 2 3 2 1
      1 2 1
        1
```

```
* * * * * * * * *
  * * * * * * *
    * * * * *
      * * *
        *
      * * *
    * * * * *
  * * * * * * *
* * * * * * * * *
```

```
1 2 3 4 5 4 3 2 1
  1 2 3 4 3 2 1
    1 2 3 2 1
```

```
    1 2 1
      1
    1 2 1
  1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

9. Write a program to print out all **Armstrong numbers** between 1 and 10000. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number. For example, 153 = (1*1*1) + (5*5*5) + (3*3*3).
10. Write a program to calculate how many 5 digit numbers can be created if the following terms apply :
    (i) the leftmost digit is even
    (ii) the second digit is odd
    (iii) the third digit is a non even prime
    (iv) the fourth and fifth are two random digits not used before in the number.

D. Arrays

1. Write a program to search for an element from an array input from the user.
2. **Inserting** an element into a position of an array. The element and the insertion point are inputs from the user.
3. Inserting a number/character into the proper position of an array which is sorted in ascending/descending order.
4. **Deleting** an element from an array.
5. Write a program to find out the **maximum, minimum, median** and **mode** of an array of numbers.
6. Find **k-th maximum** and **k-th minimum** from an array.
7. Write a program to delete **duplicate** elements from an array.
8. Write a program to find the common characters from two arrays.
9. Take a string as input and print the characters in **reverse** order. Don't use any built in string function.
10. Write a program to **merge** two arrays removing the duplicate elements.
11. Take a string as input and check whether it is a **Palindrome**. If it is not a palindrome, then add minimum no. of character after the string to convert it into a palindrome.
12. Write a program to **merge** two sorted arrays.
13. Write a program to count the **frequencies of** each **character** present in a text. (In addition to alphabet letters, count also the space, tab and punctuation letters)
14. Write a program to count the **number of letters** and **words** within a text.
15. Write a program which will search for a **substring** within a string.
16. Take n numbers as input from the user. Find out their **GCD** (Greatest Common Divisor) and **LCM** (Least Common Multiple).

17. Write a program to **Add/Subtract** two different Matrices, input from the user.
18. Write a program to **Multiply** two matrices.
19. Write a program to find out the **Transpose of a Matrix**.
20. Write a program to find out **Determinant of a Matrix**.
21. Write a program to construct a **nxn magic square**.

E. Function

1. Write a function to calculate the **factorial** value of any integer entered through the keyboard.
2. Write a function **power(a,b)** to calculate the value of **a** raised to **b**.
3. Write a function to calculate LCM of two numbers.
4. Write a function to calculate GCD of two numbers.
5. Any year is entered through the keyboard. Write a function to determine whether the year is a leap year or not.
6. A prime integer is entered through the keyboard. Write a function to obtain the **prime factors** of this number. For example, prime factors of 24 are 2, 2, 2 and 3 whereas prime factor of 35 are 5 and 7.
7. Write a function which receives a **float** and an **int** from **main()**, finds the product of these two and returns the product which is printed through **main()**.
8. Write a program which receives 5 integers and returns the sum , average and standard deviation of these numbers. Call this function from **main()** and print the results in **main()**.
9. A 5 digit positive integer is entered through the keyboard, write a function to calculate sum of digits of the 5 digit number
    (i) Using recursion
    (ii) Without using recursion
10. A positive integer is entered through the keyboard, write a program to obtain the prime factors of the number. Modify the function suitability to obtain the prime factors recursively.
11. Write a recursive function to obtain the first 25 numbers of a Fibonacci sequence. In a Fibonacci sequences the sum of two successive terms given the third term. Following are the first few term of the Fibonacci sequence:
    1 1 2 3 5 8 13 21 34 55…