UNIVERSITY OF COLOMBO, SRI LANKA

FACULTY OF TECHNOLOGY

LEVEL I EXAMINATION IN TECHNOLOGY - SEMESTER I - 2021

IC 1302 – Programming I

Three (03) hours

Answer all the questions

No. of pages: 04

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Important Instructions to Candidates

- If a page or part of this question paper is not printed, please inform the supervisor immediately
- Enter your index number on all pages of the answer script
- Write the answers to the questions in the space provided in the question paper.
- Electronic devices capable of storing and retrieving text, including electronic dictionaries and mobile phones are not allowed.

Index No: ……...

Answer all questions

1) i) What is the functionality of a compiler in a programming language? (3 marks)

ii) Consider the code segment given below. Write the values of *d* and *total* after each iteration for the first two iterations. Explain all the steps used for the derivation of your answer. (8 marks)

```
int d;
int x = 30;
int total = 0;
while (x <= 40){

  d = 2;
  while (x % d != 0 && d <= sqrt(x)){
    d++;
  }

  if (d > sqrt(x)){
    total += d;
  }
    x++;
}
```

iii) Consider the incomplete code given below. The goal of this program is to find the first *n* triangle numbers. If *n* is provided as a constant, fill in the incomplete segments *a*, *b* and *c* of the code. (6 marks)
[Hint: The triangle numbers are 1, 3, 6, 10, …..]

```
#include<stdio.h>
#define SIZE 9

int main()
{
 int i;
 int x[SIZE] = ……(a)……

 ……(b)…… // Generate the sequence
 ……(c)…… // Display the output

 }
```

iv) Convert the code in (iii) into a function named, displayTriangleNum() and display them as in the matrix below. (8 marks)

$$\begin{bmatrix} 1 & 10 & .. \\ 3 & n_5 & .. \\ 6 & n_6 & n_9 \end{bmatrix}$$

2) i) Explain the advantages of using pointers for string literals. (2 marks)

ii) A point in the x-y plane consist of two coordinates (x, y). If you are given a set of five points in the x-y plane, how would you store it using C? (4 marks)

iii) The mid-point between two points can be obtained by the following: suppose, (x_1, y_1) and (x_2, y_2) are two coordinates and the mid-point can be derived as, $\frac{(x_1+x_2)}{2}$, $\frac{(y_1+y_2)}{2}$. (5 marks)

Write a C function to find the mid-point of any two points. How would you evoke the function in your program in the main?

iv) Hashtags in social media network sites are useful to find content with a specific theme. A hashtag can be identified by alphanumerical characters followed by a "#". (4 marks)

#birthday, #event, #year2021 are examples for hashtags.

Given a set of hashtags, you are asked to arrange them in the ascending order.

Explain the steps of how you would achieve this.

v) Write a C code for the scenario explained in (iv). (10 marks)

3) i) Compare structures and arrays, describing the advantage of using each over the other in C programming. (4 marks)

ii) Suppose you need to store values of different sports items. A sports item has a name, unique numerical code, weight, colour and the type of sport it is used for. Write a suitable structure to represent these details. (4 marks)

iii) If there are five sports items stored in the structure defined in (ii), write a C code to find the minimum weight of these items. (6 marks)

iv) The above sports items need to be classified to a type named "SPRT". How can you achieve this for the structure defined in (ii)? Is this a good coding practice? Justify your answer. (6 marks)

v) Write a C code to get the output as the following, using the type defined in (iv). (5 marks)

Output:
A shuttlecock is used in badminton.

[Hint: shuttlecock is a sports item]

4) i) A novel C programmer allocates memory to every array in a program at run time. Is this a good practice to follow? Justify your answer with two reasons. (5 marks)

ii) Evaluate the following expressions by explaining each step used to derive the final result. (6 marks)

```
int x = 9;
int y = 7;
int z = 6;
int result = 0;
result = ++y - 3 || z - 5;
result +=  y + 1 > 7 && (z++ >= 6 || x++);
```

iii) Write a C program to find the number of days between two years. (6 marks)
[Hint: Consider that a year has 365 days and 52 weeks]

iv) The birthday of a certain person is on 15th January, 2001 which falls on a Monday. Write a C program to display the day of the week this person would celebrate his/her birthday on a given year, probably a year after 2001. You may reuse any code presented in (iii) above. (8 marks)

********** End of Paper **********