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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

BSc in Applied Sciences
Second Year - Semester I Examination – June/July 2022

PHY 2208 – GRAPHICAL PROGRAMMING FOR PHYSICS

Time: Two (2) hours

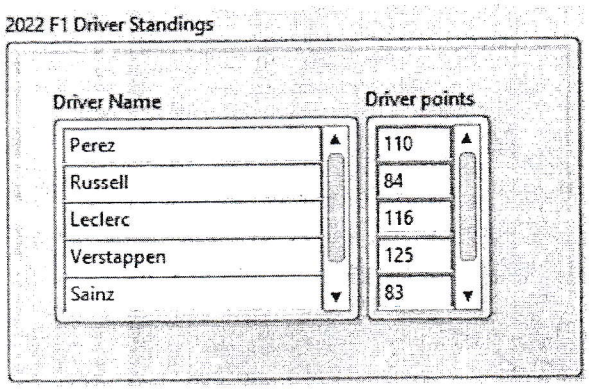
Answer All Questions

Instructions:
You are needed to;

- **Prepare a word document (answer script) including all screenshots of your codes(Block diagrams and the Front Panels) and outputs with all VIs and SubVIs.**
- **Name your word document with your index number.**
  Ex: <index_no.docx/pdf>
- **Name your VI with question number**
  Ex: Question number 1part a: Q_01_a

Question 01:

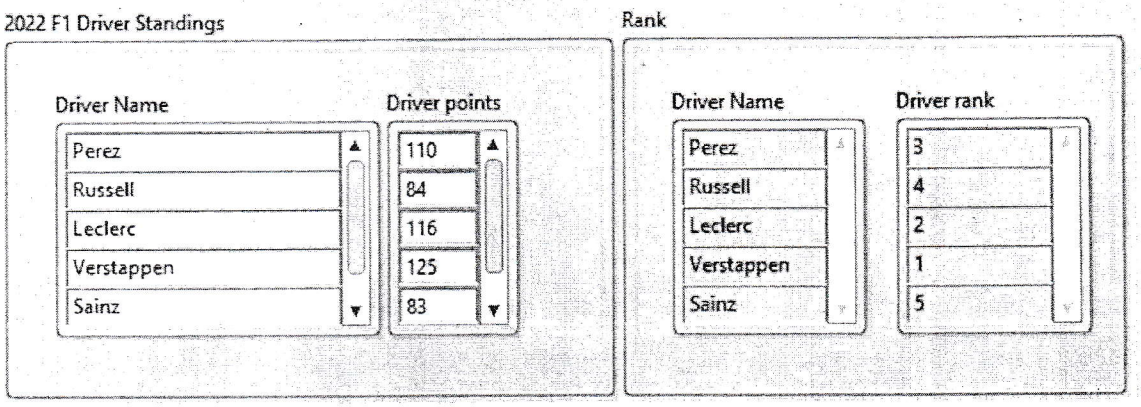
The following front panel is the input of a lab-view program.



a) Create the front panel using arrays and clusters.

b) Using the above as the inputs, place the driver rank in an array as illustrated below.

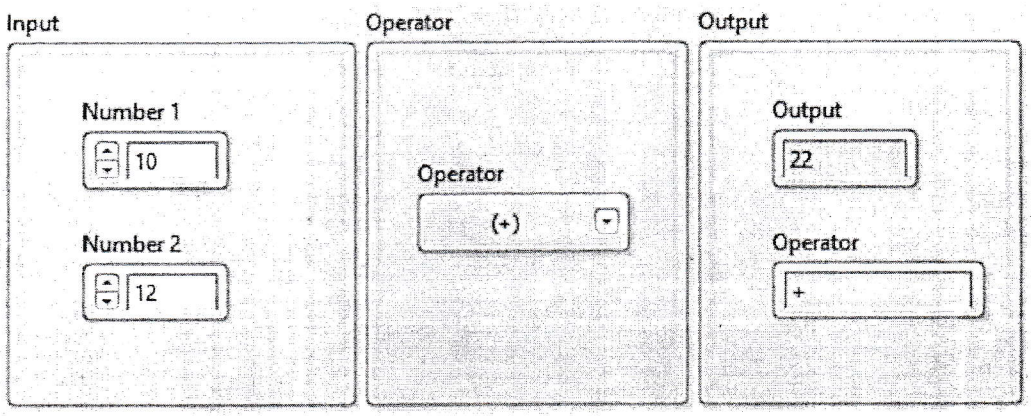
(Hint: If the driver obtained the highest driver points, he receives the 1st place.)



(25 Marks)

Question 02:

A student is trying to implement a calculator as shown below.



a) Create the front panel as shown in the figure in the LabView program.

b) Using the created front panel, construct **Addition (10+12), Subtraction (10-12), Division (10÷12)**, and **Multiplication (10×12)** of two numbers using the **menu ring**. Obtain the values from **each operator** for the given **two numbers** (Number 1 → 10, Number 2 → 12).

c) Assuming that the calculator needs to be automated, **list two structures** that can be used to improve this application.

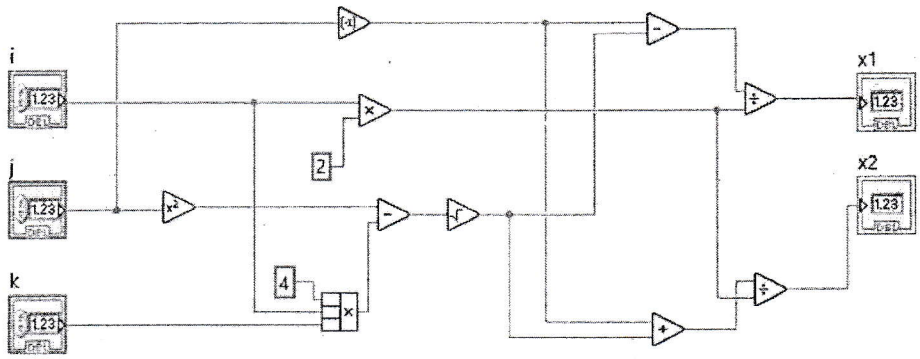
d) State **one change** you can perform to the front panel after the automation of the calculator as stated in part (c).

(25 Marks)

Question 03

a)

i) Construct the following circuit.



ii) Create a SubVI with three inputs and two outputs.

iii) Using the above SubVI, show the results for x1 and x2 for the following values.

i = 2, j = 5, and k = 3

b) Solve the following equation using **MathScript Node**.

$$f(x) = \frac{\ln(ax^2 + bx + c) - \sin(ax^2 + bx + c)}{4\pi x^2 + \cos(x - 2)(ax^2 + bx + c)}$$

where,

$a = 1,\ b = 4,\ c = 8,$ and $x = 6$

(25 Marks)

Question 04

a) Create a SubVI with one input and one output to perform the following conversion.

$$T_F = \frac{9}{5}T_C + 32$$

Using the above-created SubVI, show the value of T_F when $T_C = 50$.

b) Spectral radiance of a body is given by the following equation. Construct the following equation using the **Formula Node.**

$$B = \frac{2hv^3}{c^2} \frac{1}{e^{\left(\frac{hv}{kT}\right)} - 1}$$

where,

B – Spectral radiance of a body
v – Frequency
T – Absolute temperature
k – Boltzmann constant ($k = 1.381 \times 10^{-23}$ m^2 Kg s^{-2} K^{-1})
h – Plank constant ($h = 6.626 \times 10^{-34}$ m^2 Kg s^{-1})
c – speed of light in the medium ($c = 3 \times 10^8$ ms^{-1})
(k, h, and c are constants)

Find **B** when v = 100 Hz and T = 298.15 K

(25 Marks)

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