2020L219GCES

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination
Sample Paper

Computer Science

Section C

Ordinary Level

Time: 1 hour

80 marks

Examination number					

Centre stamp

Instructions

There is one section of the examination paper in this booklet.

Section C	Programming	80 marks	1 question

Answer all parts of the question on your digital device.

Instructions are provided for each question.

Ensure that you save your work regularly and when you complete each question.

Do not change the file names or save your work under different file names.

If you are unable to get some code to work correctly you can comment out the code so that you can proceed. The code that has been commented out will be reviewed by the examiner.

Section C	Programming	80 marks

Answer all questions parts.

Question 16

(a) Open the program called **Question16_A.py** from your device.
Enter your Examination Number in the space provided on **Line 2.**

This is a simple calculator program that can add and subtract two numbers. When this program is run it prompts the user to select addition or subtraction.

The user enters the letter 'a' if they wish to add the numbers or enters the letter 's' if they wish to subtract.

```
1   # Question 16(a)
2   # Examination Number:
3
4   num1 = 9
5   num2 = 5
6
7   print('Do you want me to (a)dd or (s)ubtract?')
8   choice = input()
9
10  if choice == 'a':
11     print (num1 + num2)
12  elif choice == 's':
13     print (num1 - num2)
14
```

Modify the program to do the following:

(i) Add a comment at the start of the program that states 'This calculator can only add and subtract'.

(ii) The user should be prompted to enter their name when the program runs. A suitable variable should be used to store the name:

```
Please enter your name: Jane
```

(iii) The program should output the following to the screen, including the user's name:

```
Hello Jane.
Welcome to the addition and subtraction calculator.
```

(iv) The program currently adds the two numbers stored in the variables **num1** and **num2**. Modify the program so that the user is asked to enter the numbers that will be added or subtracted:

```
Enter the first number:4
Enter the second number:5
```

(v) Currently the program only displays the answer. In the above example, when addition is selected, the output is:

```
9
```

Modify the program so that it outputs the equation and the answer. When the program is run the output may look as follows:

```
4 + 5 = 9
```

(vi) The program only works if the user enters a lowercase 'a' for addition or a lowercase 's' for subtraction. Modify the program so that it will still work if the user enters an uppercase 'A' for addition or an uppercase 'S' for subtraction.

(vii) If the user enters an invalid option (anything other than 'a', 'A', 's' or 'S') the program terminates without warning. Edit the program so that if the user selects any other option the program will output a message stating:

```
Invalid option
```

(viii) If the user enters an invalid option when prompted to select addition or subtraction the program terminates. Modify the program so that it will continue to prompt the user to select either addition or subtraction until a valid option is selected.

When the program is run the output may look as follows:

```
Do you want me to (a)dd or (s)ubtract?
w
Invalid option
Do you want me to (a)dd or (s)ubtract?
a
4 + 5 = 9
```

Save and close your file before moving onto the next part.

(b) Open the program called **Question16_B.py** from your device.
Enter your Examination Number in the space provided on **Line 2.**

This program also runs a calculator but this calculator can only multiply and divide.
When you compile the program, you will be prompted to enter '1' for multiplication or '2' for division. The program generates 2 random numbers between 1 and 12 that are either multiplied or divided.

This program uses functions.

```
1  # Question 16(b)
2  # Examination Number:
3
4  # This function multiplies two numbers
5  def multiply(x, y):
6      return x * y
7
8  # This function divides two numbers
9  def divide(x, y):
10     return x / y
11
12 # Main Program
13 import random  # To generate random numbers
14
15 print("Select operation.")
16 print("1.Multiply")
17 print("2.Divide")
18 # Take input from the user
19 choice = input("Enter choice(1/2):")
20
21 num1 = random.randint(1,12)
22 num2 = random.randint(1,12)
23
24 if choice == '1':
25     print(num1,"*",num2,"=", multiply(num1,num2))
26 elif choice == '2':
27     print(num1,"/",num2,"=", divide(num1,num2))
```

Modify the program to do the following:

(i) When the user selects division the answer that is returned can contain many digits after the decimal point. Round this number so that it has only one decimal place e.g. 4.3.

(ii) Modify the program so that the calculator works for multiplication, division, addition and subtraction.
The user should also be able to enter the two numbers, rather than using two random numbers.
You will need to:

a. Create new functions to perform addition and subtraction.

b. Give the user the choice to select addition and subtraction as well as multiplication and division.

c. Allow the user to enter the two numbers.

When the program is run the output may look as follows:

```
Select operation.
1.Multiply
2.Divide
3.Add
4.Subtract
Enter choice(1/2/3/4):1
Enter first number: 5
Enter second number: 6
5 * 6 = 30
```

(iii) The program currently calculates the answer to a single question. Modify the program so that the user can specify the number of calculations they wish to ask the calculator. The calculation number should appear with each question.
When the program is run the output may look as follows:

```
How many calculations will I do?:3
Calculation 1
Select operation.
1.Multiply
2.Divide
3.Add
4.Subtract
Enter choice(1/2/3/4):1
Enter first number: 5
Enter second number: 6
5 * 6 = 30

Calculation 2
Select operation.
1.Multiply
2.Divide
3.Add
4.Subtract
Enter choice(1/2/3/4):3
Enter first number: 7
Enter second number: 8
7 + 8 = 15

Calculation 3
Select operation.
1.Multiply
2.Divide
3.Add
4.Subtract
Enter choice(1/2/3/4):2
Enter first number: 8
Enter second number: 3
8 / 3 = 2.7
```

Save and close your file before moving onto the next part.

(c) Open the program called **Question16_C.py** from your device.

Enter your Examination Number in the space provided on **Line 2.**

This python file contains an empty list called **`squared_numbers`**.

The first squared number is 1 (1*1), the second squared number is 4 (2*2).

```
1  # Question 16(c)
2  # Examination Number:
3
4  squared_numbers = []
5
```

Write a Python program to do the following:

(i) Calculate the first 20 squared numbers and place them in the list **`squared_numbers`**. You are expected to use a loop and the **`append()`** method.

(ii) Print the list **`squared_numbers`** to the screen.

(iii) Ask the user which of the first 20 squared numbers they would like to see. Print that squared number to the screen by selecting it from the list **`squared_numbers`**.

When the program is run the output may look as follows:

```
[1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225,
256, 289, 324, 361, 400]

Which squared number will I display (1-20)?:16
256
```

Save your file.

Ensure that you have saved and closed all files before you finish the examination.

Acknowledgements
None

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