The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical and Computer Engineering

Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	**: EEI3372 Programming in Python**
Academic Year	: 2019/20
Date	: 31st July 2020
Time	: 0930-1230hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **PART - A and PART - B** in **Eight (8)** pages.
3. **PART - A** is compulsory. You need to answer ALL questions in **PART - A**. **PART – A** carries 40 marks.
3. Answer any **Four (4)** questions in **PART- B**. All questions carry equal marks.
4. Answer for each question should commence from a new page.
5. This is a Closed Book Test **(CBT).**
6. Answers should be in clear hand writing.
7. Do not use red colour pen.

PART – A

Answer ALL questions in PART – A (40 Marks)

1. Write short answers for the following questions.
   a. Briefly explain two major characteristics of Python programming language?

   [2 Marks]

   b. Explain in your own words how memory management is done in Python?

   [3 Marks]

2. Write a function called **quantityDiscount** in Python that calculates the discount on a purchase from an on-line bag store. All bags on the site sell for Rs. 2000. Quantity discounts are given as follows:

   [5 Marks]

Quantity	Discount
1 - 9	None
10 - 19	15%
20 - 49	25%
50 - 99	35%
100 or more	45%

   Your function should accept the number of bags purchased as an argument and return the total cost after the discount. Comment your function using IPO notation.

   Note: you are not required to write a full program for this question. Only the function as specified.

3. Write a program in Python that prompts the user for a number of bags that they wish to purchase from the on-line store. The user can only enter values greater than zero – anything else should cause the program to print an error and ask for another number.

   Utilize the function **quantityDiscount** you wrote in *question 2* and generate the output listed below. The program should prompt the user at the end of your program to see if they would like to purchase additional bags and, if so, program should run again.

   [7 Marks]

Output

```
How many bags would you like to purchase? 10

Original cost: Rs. 20 000.00

Cost after discount: Rs. 17 000.00

Thanks for your order!

Would you like to purchase more bags? (yes/no): no
```

4. Write a price-averaging program in Python that asks the user the number of products they have purchased on a recent shopping trip. You can assume they will enter a positive integer value. Next, prompt the user for the amount they paid for each product and calculate their average cost per product, formatted to two decimal points. You can assume the user will enter floating-point numbers, but you should constrain users to positive values only.

[7 Marks]

Here is a sample output of this program:

```
How many products did you purchase? 3
How much did product #1 cost? 54.00
How much did product #2 cost? -100
Sorry, only positive values allowed. Please try again.

How much did product #2 cost? 98.00
How much did product #3 cost? 87.00
Average Cost: 79.67
```

5. The chart below show a set of data types and some attributes for each data type. Draw the chart in your answer sheet and fill it. Write in Yes, No or N/A based on the attribute in the column header and the type in the left-most column. Write a syntactically correct literal value for each type in the right-most column. An example row has been filled in.

[5 Marks]

	mutable	ordered	compound	Literal value
float (float)	No	N/A	No	5.2
int (integer)				
str (string)				
list (list)				
dict (dictionary)				
tuple (tuple)				

6. Using the two variable declarations below, write the output of end of the following lines of code? If the code results in an error, write "error".

[6 Marks]

animal = "giraffe" idx = len("animal")

a. print("animal"[idx])
b. print(animal[2:])
c. print(animal[-1] + str(idx))
d. print(animal[4:(idx * 2)])
e. print("animal"[-2])
f. print(animal[idx])

7. Read the code sample in the first column. Answer the questions in the second column. Answer should be written in the answer book with respective question number.

[5 Marks]

	Code	Question
(a)	x = [[1, 2, 3], [4, 5, 6], [7, 8, 8]] y = [] for i in range(len(x) - 1, -1, -1): y.append(x[i].pop())	What are the values of **x** and **y**?
(b)	z = 'umxexcusemex!' y = z.split('x') l = '8'.join(y)	What are the values of **y** and **l**?
(c)	x = [[[1,2,3],[4,5,6]], [1,2,3,4,5]] val = x[1].index(4) print(val // 2)	What code would you use to retrieve the value 6 from x. What is the output of the program?

(d)	car = {'x':0, 'y':200}
	def move_car():
	  for i in range(4):
	  car['x'] += 20
	move_car()
	print(car)
		What is the output of this program?

(e)	s = ''
	greeting = 'Hello there!'
	for k in greeting.upper():
	  if k not in 'AEIOU' and k not in s:
	  s += k
	print(s)
		What is the output of this program?

PART- B

Answer ANY 4 questions in PART – B (4 x 15 = 60 Marks)

Question 1

(a) Write the output of the following program segments.

(i)

```
for x in range(10, 15):
    print (x)
```

(ii)

```
for x in range(5, 7):
    counter = 0
    while counter < 3:
        print (x, ":", counter)
        counter += 1
```

(iii)

```
def x(y):
    print (y)
    y += 1
    z(y)
    print ("ok")

def z(y):
    print (y)

x(5)
```

(b) (i) List down the commands used to read and write into a file using Python program.

(ii) Explain the use of format operator in file processing using Python program.

(iii) Explain how exceptions are handled in Python. Illustrate your answer with a suitable example.

Question 2

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(a) In Python, strings are immutable while lists are mutable. What is the difference?

(b) How does the '//' operator differ from the '/' operator? Give an example of where '//' would be needed.

(c)

i. Lists and tuples are two data structures that have some similarities and some differences.

ii. Define a syntactically correct tuple, called t, that contains the values 1, 2, and 3 and a syntactically correct list, called 1st, that contains the values 1, 2 and 3.

iii. What can you do with a list that you can't with a tuple?

(d) United Airlines will only allow carry-on bags that are no more than 22 inches long, 14 inches wide, and 9 inches deep. Assuming that variables named length, width, and depth have already been assigned values, write an expression combining the three that evaluates to **True** if a bag fits within those limits, and **False** otherwise.

Question 3

(a) Write a program that lets the user figure out how many items they can purchase at a local coffee shop. Begin by asking the user to enter the amount of money available as a float. Then ask the user to select a product from a pre-determined list. Figure out how many items the user can purchase, noting that the coffee shop does not sell fractional amounts (i.e. you can't buy half a donut). Output should look like as below.

Output

```
How much money do you have? Rs. 1000.00
What would you like to buy?
Donut (d) – 150
Coffee (c) – 100
Bagel (b) – 250
Scone (s) – 275
Enter your choice (d/c/b/s): d
You can purchase 6 donuts with Rs. 1000.00
```

Note that you cannot assume that the user will enter a valid product (i.e. they could type in the string "donut" instead of the string "d"). In this case you need to present the user with an error message (i.e. "Sorry, that's not a valid product") – you do not need to reprompt them (you can just end the program). You can assume that the user will input valid floating-point numbers when prompted.

(b) (i) Explain "string slicing". Illustrate how it is done in Python with a suitable example.
(ii) Demonstrate the working of +, * and slice operators in Python.

Question 4

(a) OUSL has asked you to write a program to help them determine if a student is suitable to be given a scholarship. Write a program that uses the following criteria to determine whether a given applicant should be given a scholarship:

- Combined CAT score of 1600 or more
- GPA of 3.0 or higher
- At least 3 extracurricular activities

However, OUSL places a heavy emphasis on extracurricular activities, so students with 5 or more activities only need a 1400 combined score on their CAT and a GPA of 2.8. Comment your code as necessary. You can assume that the user will enter floating-point values.

Here is a sample running of the program. Note that you should ask the user if they want to repeat the process for additional students when you are finished.

output

```
Student name: Anupama
Combined CAT Score: 1500
GPA: 3.1
# of extracurricular activities: 7
Anupama should be admitted! Another student? yes
```

(b) Compare and contrast Java and Python.

Question 5

a) Find 2 values that a user can input that will cause the following program to crash. Why is an error caused by the input? Fill in the blanks below the code in your answer sheet.

```
import random

cards = ['empty', 'empty', 'penny']

random.shuffle(cards)

a = input('Please choose a card: 0, 1 or 2\n>')

number = int(a)

if cards[number] == 'penny':

        print('you guessed right!')

else:

    print('nope, nothing there')
```

1. Error Causing Input 1: ..... Reason for error: .....
2. Error Causing Input 2: ..... Reason for error: .....

b) Use exception handling to handle the error in above question (1 & 2) and display the error messages that are printed out can be of your choosing (for example, "bad input" for one and "sorry, try again" for the other). Rewrite the code from the previous program.