NANYANG TECHNOLOGICAL UNIVERSITY

SEMESTER 2 EXAMINATION 2014-2015

CE1003/CZ1003 – INTRODUCTION TO COMPUTATIONAL THINKING

Apr/May 2015 Time Allowed: 2 hours

INSTRUCTIONS

1. This paper contains 4 questions and comprises 5 pages.
2. Answer **ALL** questions.
3. This is a closed-book examination.
4. All questions carry equal marks.

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1 (a) (i) What is the common functionality existed in both compilers and interpreters?

(2 marks)

(ii) Name one advantage of interpreter over compiler and elaborate how an interpreter supports such an advantage.

(3 marks)

(b) The Python code below aims to constantly regulate the temperature of a freezer, so that the temperature stays in between -3 and -5 degrees.

```
while True
   wait()            # wait for one minute
   temp = getTemp()  # get current temperature (in float)
   if temp < -3.0:
      raiseTemp()    # raise (increase) temperature
   else:
      lowerTemp()    # lower (decrease) temperature
   tempInt = int( temp + 0.5 )  # rounding
   showTemp( tempInt )  # display temperature (in integer)
```

However, there are a number of errors in the code. Please identify the errors and then describe how to fix each of them.

(8 marks)

Note: Question No. 1 continues on Page 2

(c) Write a Python program that reads an integer from the user, which is the width of the pattern below, and then prints out the pattern. You may assume that the input integer is at least 3. No error checking on the user input is required. Hint: use nested for loops and `print("x",end="")`.

Here are the sample runs:

```
input the width of the pattern: 3
x
xx
xxx
x x
xxx
 xx
  x

input the width of the pattern: 5
x
xx
xxx
xxxx
xxxxx
x   x
x   x
x   x
xxxxx
 xxxx
  xxx
   xx
    x
```

(12 marks)

2 (a) (i) What are tokens during the processing of interpreters?

(2 marks)

(ii) There are different types of tokens. Name one token type and describe its usage.

(2 marks)

(b) Write a Python program that reads a positive integer `n` from the user, and displays the sum of the last five digits of the factorial of `n`.

For example, if `n` is 10, the factorial of `n` is 3628800, so the last five digits is 28800 and their sum is 18. No error checking on the user input is required, and `n` is at least 10.

(11 marks)

Note: Question No. 2 continues on Page 3

(c) Trace the following program carefully and write down what it prints out.

```
import random

a = b = c = d = e = 0

for i in range(100):
    a = 1 - a
print( a )

for i in range(1,3,5):
    b += i
print( b )

b = 0
while c < 3:
    c,b = b,c+1
    if c // 2 == 0 :
        continue
    c = c + 2
print( c )

while d % 2 != 1 or d % 3 != 1:
    d = d + 5
else:
    d = d / 5
print( d )

while e != 7:
    e = e + random.randint( 1, 5 )
    if e > 50:
        e = 0
print( e )
```

(10 marks)

3. (a) Write a Python statement to define a string variable with the following sentence.

```
Hart said: "It is, but hadn't ought to be."
```

(3 marks)

(b) Describe the rule that unqualified namespace follows.

(5 marks)

Note: Question No. 3 continues on Page 4

(c) (i) When will you need to use collective data structures? Give two examples.

(3 marks)

(ii) Describe two differences between the string and set data structures.

(4 marks)

(iii) Define what recursion is and why it is different from looping.

(4 marks)

(d) (i) Trace the following program carefully and write down what the program prints out.

```
myText = "123456"

for i in range(2, 10):
   print(myText[i])
```

(4 marks)

(ii) Re-write the program in Q3d(i) such that it prints out the contents of `myText` in reversed order without using the for/while loop.

(2 marks)

4. (a) (i) Why should you specify the file encoding when opening a file?

(2 marks)

(ii) Write a Python statement to open the file `try/test.txt` with an encoding `utf-8`.

(4 marks)

(b) Describe the main components of defining a procedure in Python.

(6 marks)

(c) What is an exception? Give an example.

(2 marks)

Note: Question No. 4 continues on Page 5

(d) Describe the two common approaches to handle exceptions in your code. Discuss their differences.

(6 marks)

(e) Write a Python program that reads a file called `test.txt`. Your program has to consider at least one exception.

(5 marks)

END OF PAPER

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Please read the following instructions carefully:

1. **Please do not turn over the question paper until you are told to do so. Disciplinary action may be taken against you if you do so.**

2. You are not allowed to leave the examination hall unless accompanied by an invigilator. You may raise your hand if you need to communicate with the invigilator.

3. Please write your Matriculation Number on the front of the answer book.

4. Please indicate clearly in the answer book (at the appropriate place) if you are continuing the answer to a question elsewhere in the book.