Exam
Object Oriented Programming 1 - Python
BTH000

Time allowed: Three hours.
No books or notes are allowed by the students.
(International College, ZJUT, provides an English-Chinese dictionary in the exam room)

Total Points: 100

Important!

- All questions are related to Python Programming
- The questions are not ordered by difficulty, so if you get stuck on one question please go ahead with the next. You can always go back if there is time.

Good Luck!

1. Short answers

Σ: 20

(a) What is a *parameter list*? (2p)

(b) A *destructor* function is never called explicitly. When is a destructor called? (2p)

(c) How do you write code in Python to determine if the value of an integer variable is an odd number? (2p)

(d) Write Python code to determine if the value of a variable `nr` lies inside the closed interval [-1..5]? (2p)

(e) What will be printed when running `print("hello world {} all".format('4'))`? (2p)

(f) What will be printed when running `print(type([1,2]))`? (2p)

(g) What will be printed when running the following? (2p)

```
def f(): pass

print(type(f()))
```

(h) What will be printed when running the following? (2p)

```
names1 = ['Carina', 'Birgitta', 'Cheng', 'Lin']
names2 = [name.lower() for name in names1]

print(names2[1][0])
```

(i) What will be printed when running the following? (2p)

```
numbers = [1, 2, 3, 4]
numbers.append([5,6,7,8])
print(len(numbers))
```

(j) What will be printed when running the following? (2p)

```
x = 1
y = "2"
z = 3

the_sum = 0
for i in (x,y,z):
    if isinstance(i, int):
        the_sum += i
print(the_sum)
```

2. Explain

Σ: 16

(a) What is a default parameter in a parameter list? What rules applies to default parameters? (4p)

(b) Describe the principle of the sorting algorithm *Selection Sort* and show how it works on the sequence 12, 4, 32, 11, 23, 67, 5, 19, when sorted with Selection Sort. (4p)

(c) Explain the difference between *interpreted* and *compiled* programming languages. In what situation is a compiled language better to choose? (4p)

(d) Explain when there is a need for *deep copying* of an object. Also give an example! (4p)

3. Read Python Code

Σ: 12

(a) Explain carefully what happens in this program. Finally present what the program will print. (6p)

```
alist = []
for i in range(6,-4,-1):
    alist.append(i)
print(alist[-1:-4:-2])
```

(b) Explain carefully what happens in this program. Finally present what the program will print. (6p)

```
i = 0
flag = 0
stop = False
while not stop:
    i = i + 1
    if i % 7 == 0:
        flag = flag + 1
        if flag==2:
            stop = True
print(i)
```

4. Debugging Code

Σ: 12

(a) Which statement is true about the following program? (4p)

```
def function(a):
    if a % 3 == 0:
        print("True")
    else:
        print("False")
    return

function(8)
```

A. This program will give a runtime error and will not work
B. This program will not yield any output
C. This program will print the text ”False”
D. This program contains a syntax error and will not work
E. This program contains an indentation error and will not work
F. None of the above is true

(b) Which statement is true about the following program? (4p)

```
i = 8
for j in range(0, i/2, 2):
    print(j/3)
```

A. This program is correct and will only print a ’0’
B. This program contains a syntax error and will not work
C. This program will give a runtime error
D. This program will print ’0’ twice
E. This program will print ’0’ and ’1’
F. None of the above is true

(c) Which statement is true about the following program? (4p)

```
a = input('Enter a value:')
    if a % 2 == 0 and a > 1:
        print('You entered an even number')
    else:
        print('You entered an odd number')
```

A. This program is entirely correct
B. This program contains only a syntax/indentation error
C. This program will give only a runtime error: ”TypeError”
D. This program contains both ”TypeError” and syntax/indentation error
E. None of the above is true

5. Write Some Code

Σ: 20

(a) Write a Python function that takes three strings as input parameters and returns the smallest of them (the one that comes first alphabetically). (10p)

(b) i. Provide a Python implementation of a function `first_odd_squares()` that takes a positive integer, `n`, as its only argument. The function should return a list with the first n perfect squares that are not even numbers. E.g., if n were 2 the function should return the list `[1, 9]`. (8p)

ii. Write a program calling the function from the former task with the number 4, and printing the result nicely on the screen. (2p)

6. Classes and Objects

Σ: 20

Create a program that implements a cookbook with 100 recipes of different food dishes. You shall write the class `Dish` as well. Every dish in the cookbook shall be implemented by an object of the class `Dish`. Thereafter the program shall print all the recipes in the cookbook.

i. Write the class `Dish`. The attributes of `Dish` should be the dish name (a string) and a dictionary with the ingredients (as strings) and their corresponding quantity (float numbers). Let the constructor take the dish name as an input parameter. Also, in the constructor code, ask the user for the ingredients name and quantity and take interactive input to build the dictionary for the dish. The class shall also have a `__str__()` function in order to be able to print the object in a nice way. (15p)

ii. Write a program creating the cookbook as a list of `Dish` objects. The program shall 100 times ask the user for a dish name add that dish to the list as a `Dish` object.
Finally, after the cookbook is built, let the program print the whole cookbook on the screen. (5p)