Student ID : _____

Student Name: _____

CITY UNIVERSITY OF HONG KONG (DongGuan Campus)

Course code & title : CS1302 Introduction to Computer Programming

Session : Semester B 2024-2025

Time allowed : Part1-3: 40 minutes, Part 3: 40 minutes

This paper has 4 parts: part 1-3 are paper-based without computer, part 4 needs to be completed in lab computers in Jupyterlab (no Internet access except Canvas). After completing and submitting this exam paper to the teachers, you can log into the computer to start part 4.

Note:

1. Answer ALL the questions in the space provided in the answer paper

Part 1 Code understanding (15 marks)	Part 2 MC (10 marks)	Part 3 Short questions (10 marks)	Part 4 Code writing (25 marks)	**Total** **(60 marks)**

2. IMPORTANT:

   No calculator is allowed; otherwise you will get zero mark.

   Do not cheat; otherwise you will get zero mark.

3. This question paper should NOT be taken away.

Remarks:

For all written code required by the questions:

1. You should give precise Python code with proper programming styles, in particular, appropriate code design, naming and code formatting. Marks may be deducted for redundant or unnecessary code.
2. Unless specifically mentioned, modules/libraries/functions other than built-in functions, math modules are not allowed.

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*This is a **closed-book** examination.*

No materials or aids are allowed during the whole examination. If any unauthorized materials or aids are found on a candidate during the examination, the candidate will be subject to disciplinary action.

Part 1 (15 marks) Short Questions

For questions below, please write down the output from each program. If the output has multiple lines, you need to write all of them in the correct form. (15 x 1 mark - 15 marks)

(1)

```
a = "Hello"
b = "World!"
print(a, "b", sep="-")
```

Output: Hello-b

(2)

```
a = "b"
b = "c"
c = "d"
print(a + b + c, "a" + "b" + "c", sep=", ")
```

Output: bcd, abc

(3)

```
print(str(123+123), int("123"+"123"), sep=", " )
```

Output: 246, 123123

(4)

```
msg = "CS1302"
print(msg[0], msg[5], len(msg), sep=", ")
```

Output: C, 2, 6

(5)

```
print(16//3, 17%3, sep=", ")
```

Output: 5, 2

(6)

```
print(2**2, 2*2**2, sep=", ")
```

Output: 4, 8

(7)

```
print(True and False, True or False, sep=", ")
```

Output: False, True

(8)

```
print(True and True or False and False, True or True and False or False, sep=", ")
```

Output: True, True

(9)

```
print(bool(-1), bool(0), bool(1), sep=", ")
```

Output: True, False, True

(10)

```
for i in "Hello":
    if i=='e':
        continue
    if i=='l':
        break
    print(i)
else:
    print("End")
```

Output: H

(11)

```
def get_true():
    print("T", end=", ")
    return True

print(not get_true())
```

Output: T, False

(12)

```
def get_true():
    print("T", end=", ")
    return True

print(True or get_true() and get_true())
```

Output: True

(13)

```
for i in range(0,5):
    print(i, end=", ")
print(i)
```

Output: 0, 1, 2, 3, 4, 4

(14)

```
i=0
while i<5:
    print(i, end=", ")
    i += 1
print(i)
```

Output: 0, 1, 2, 3, 4, 5

(15)

```
# Loop A
for i in range(5):
    print(i, end=" ")
    if i == 2:
        continue
else:
    print("else of A", i, sep=":", end="; ")

# Loop B
for i in range(5):
    print(i, end=" ")
    if i == 2:
        break
else:
    print("else of B", i, sep=":", end="; ")
```

Output: 0 1 2 3 4 else of A:4; 0 1 2

Part 2 (10 marks) MC Questions

Please choose the best answer (A, B, C, or D) for each question below. There's only one answer for each question. Each question has 2 marks. (5*2marks=10 marks)

(1) Which of the following is/are valid expressions?

i) 123 + 123
ii) "123" + 123
iii) "123" + "123"
iv) "abcd" * 2

A. i only
B. i and iii only
C. i, iii and iv only
D. All of i, ii, iii, and iv

Answer:___C_____

(2) Which of the following is/are valid?

i) a = 123
ii) 123 = a
iii) a = "_"
iv) _ = "a"

A. i only
B. i and ii only
C. i, iii and iv only
D. All of i, ii, iii, and iv

Answer:___C_____

(3) Which of the following will produce the output that contains the word *None*?

i) print(print())
ii) print(print)
iii) print("None")

A. i only
B. i and iii only
C. ii and iii only
D. All of i, ii, and iii

Answer:___B_____

(4) Consider the statement below:

```
result = "3/5" if "3/5" > "4/15" else "4/15"
```

Which of the following is/are correct?

i) It is invalid because it should be

```
result = "3/5" if "3/5" > "4/15" else result = "4/15"
```

ii) It is invalid because strings cannot be compared using the > operator.
iii) It is valid and the `result` variable will obtain 0.6
iv) It is valid and the `result` variable will obtain "4/15"

A. i only
B. ii only
C. iii only
D. iv only

Answer:__D_____

(5) Consider the program below:

```
1  def f(a):
2      return a>10
3      print("Result is returned")
4
5  x, y, z = 3, 30, 300
6
7  count = 0
8  if f(x):
9      count += 1
10 elif f(y):
11     count += 1
12 elif f(z):
13     count += 1
14
```

Which of the following is/are correct?

i) `f(z)` on line 12 will not be executed
ii) Finally `count` is 2
iii) `"Result is returned"` will be shown 1 time
iv) `"Result is returned"` will be shown 2 times

A. i only
B. i and iii only
C. i, ii, and iv only
D. ii and iv only

Answer:__A_____

Part 3(10 marks) Short questions.

1. Please explain what is the Von Neumann architecture? Explain its components and corresponding functions. (4 marks)

The Von Neumann architecture, also known as the Princeton architecture, is a computer architecture based on that described in 1945 by the mathematician and physicist John Von Neumann.

The Von Neumann architecture consists of the following three main components:

1. Input/output device: read information into or out of the memory unit upon command from the CPU

2. Central Processing Unit (CPU)

   - Arithmetic and Logic Unit (ALU): performs arithmetics like a calculator (but for binary numbers)

   - Control Unit (CU): directs the operations of the processor in executing a program.

3. Main memory: stores both data and instructions

2. Please explain the difference between for loop and while loop (at least one difference) (2 marks).

   (can get full mark as long as the answer mentions one of the differences)

Feature	**`for` Loop**	**`while` Loop**
Use Case	Iterates over a sequence or iterable.	Repeats based on a condition.
Number of Iterations	Known (finite or determined by sequence).	Unknown (infinite, depends on condition).
Termination	Stops when the iterable is exhausted.	Stops when the condition becomes `False`.
Risk of Infinite Loop	Unlikely (sequence has a defined end).	Possible if condition never becomes `False`.
Example Use	Iterating over a list, range, or string.	Waiting for user input or monitoring a condition.

3. Please complete the following table which converts the same number into different representation systems. (each space 1 mark, in total 4 marks)

Binary (base-2)	Decimal (base-10)
1101010	106
101011	43
1001010	74
10001	17

Part 4 (25 marks) Coding

- You need to download the mock_midterm_exam.ipynb from Canvas->Files->Mock Midterm exam, then launch JupyterHub in the lab computers to complete it. Note that you won't have Internet access during the exam except access to Canvas.
- You need first submit the papers to the teacher, then you can start the computer to access the coding questions.

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