Computational Thinking and Programming – A.Y. 2018/2019

First partial written examination (02) – 28/11/2018

Given name: _____

Family name: _____

Matriculation number: _____

University e-mail: _____

Please answer to the following 5 questions [40 minutes max, 1 point each, max score: 5 points]

1. Describe the main five widgets of the flowchart diagram model.

2. Describe what is a high-level programming language.

3. Consider your 10 digits matriculation number, and substitute all the even numbers with "0" and all the odd numbers with "1". Suppose that there exists a Turing machine with the head positioned in the rightmost digit of your matriculation number encoded as explained above – i.e. the tape of the Turing machine is initialised with such numbers. Write down the numbers contained in such ten cells after the execution of the following rules (starting state: A; end state: C):

Current state	**Tape symbol**	**Write symbol**	**Move head**	**Next state**
A	0	0	L	A
A	1	0	L	B
B	0	1	R	B
B	1	1	L	C
C				

4. Consider the last digit (i.e. the rightmost) of your matriculation number as stored in the variable `my_digit`. Write down the result of the execution of the following algorithm passing `my_digit` as input (i.e. `f(my_digit)`).

```
def f(cur_digit):
    l = list()
    l.append("a")
    l.append("b")
    l.extend(l)
    l.extend(l)
    l.append("c")
    for i in range(cur_digit):
        if l[i] != "a" and "a" in l:
            l.remove("a")
        else:
            l.insert(i, "c")
    return l
```

5. Write the body of the Python function `def do_it(queue, number)` that takes a *queue* and a *number* in input, and returns `None` if *number* is higher than the number of items in *queue*, otherwise it removes the first *number* items from *queue* and then returns *queue*. Example of execution:

```
my_queue = deque(["a", "b", "c", "d", "e"])
my_number = 3
do_it(my_queue, my_number) returns deque(["d", "e"])
```