الجامعة العربية المفتوحة
Arab Open University

Faculty of Computer Studies

TM112

Introduction to Computing and Information Technology 2

MTA Makeup Exam

Fall 2019-2020
Date: TBA

Solution

Number of Exam Pages: (including this cover sheet) (6)	**Time Allowed: 120 Minutes**

Instructions:

1. Write the answers on the separate answer booklet
2. Total marks: 60 marks
3. The exam consists of three parts:
   A. MCQ Questions (**10 marks**): You should answer all questions.
   B. Short-Answer Questions **(20 marks):** You should answer all questions.
   C. Programming/Problem Solving Questions **(30 marks):** You should answer all questions.
4. The use of calculators is not allowed

PART 1: Multiple Choices questions [5 x 2 = 10 Marks]

Answer <u>all</u> the following questions by choosing the <u>most</u> correct statement.

You should dedicate approximately **10 minutes** for this part.

1- Which of the following is not a secondary memory?
   a- Hard disk drive
   b- Read Only Memory
   c- Flash memory
   d- None of the mentioned.

2- The task of converting the source code into _____ is carried out by translators.
   a- Transformers
   b- Compilers
   c- Machine Language
   d- Assembly Language.

3- The register that holds and reflects essential information about the last operation executed is called:
   a- Status register
   b- General purpose register
   c- Accumulator
   d- Data Register

4- What is the best answer that describes the OR operator?
   a. The output is always 1.
   b. The output is 0 if one of the inputs is 0.
   c. The output is 1, only if all inputs are 1.
   d. The output is 1 if any input is 1.

5- Some very early computers, such as the ENIAC, tried to represent data using:
   a. Base-8 system
   b. Base-4 system
   c. Base-16 system
   d. Base-10 system

PART 2: Short Answer Questions [20 Marks]

This part consists of **4 questions**. You must attempt **<u>all questions</u>**. You should dedicate approximately **40 minutes** for this part.

<u>Question 1:</u> <u>[4 marks]</u>

Languages such as JavaScript and Python are considered as interpreted languages.
Discuss one advantage and one disadvantage of such interpreted languages over other languages that use compilers.

Answer: (4 marks: 2 marks for each point)

- The advantage of an interpreted language is that the potentially lengthy process of compilation does not need to be gone through for each small change in the source code.
- The main disadvantage is that the translation process must take place every time a program is executed, resulting in a slower execution of the program.
  Or any other valid answer.

Question 2: [4 marks]

Consider the following code that is free of errors:

```
lastNumber = 6
for row in range(1, lastNumber):
   for column in range(row, 0, -1):
      print(column, end=' ')
   print("")
```

What will be the output of the above program?

Answer: (4 marks)

The output:

```
1
2 1
3 2 1
4 3 2 1
5 4 3 2 1
```

Question 3: [6 marks]

Suppose we want to build a logic circuit with two inputs, A and B, that implements the XOR operator. The XOR output is 1 if B is different than A.

a- Draw the truth table showing the desired outcomes (A XOR B).

b- Deduce the final logic expression. (the final expression is deduced from the value(s) at the output which is(are) equal to 1.

You can use the below table.

A	B	A XOR B	Logic Expression(s)

Answer: (6 marks: 4 marks for the truth table, 2 marks for the logic expression)

1 + 1 + 2 + 2

A	B	A XOR B	Logic Expression(s)
0	0	0	
0	1	1	NOT A AND B
1	0	1	A AND NOT B
1	1	0	

The logic expression answer could be either **(NOT A AND B) OR (A AND NOT B),** or **(A'B + AB')**

Question 4: [6 marks]

Define the following:

a- Control Unit

b- Processor clock

Answer: (6 marks: 3+3)

a- The **control unit** has the role of coordinating the movement of data and instructions within the processor.
b- The **Processor clock** sends a synchronising signal between the circuits within the processor to ensure that they remain in step.

PART 3: Programming/Problem Solving Questions [30 Marks]

This part consists of **3 questions**. You must attempt **all questions**. You should dedicate approximately **60 minutes** for this part.

Question 1: [10 marks]

a- Convert the binary number 1010110 to decimal. Show the steps.
b- Find the decimal equivalent of the 8-bit sign-magnitude number 11110001. Show the steps.
c- Represent the number 0.0516 in scientific notation.

Answer: [10 marks: 4+3+3]

a- [4 marks: 2 marks for showing the steps, 2 marks for the answer]

$1010110_2=86_{10}$

b- [3 marks]

Sign 64 32 16 8 4 2 1
1 1 1 1 0 0 0 1
-(64 +32+16+ 1) = -113

c- [3 marks]

0.0516 will be represented as $5.16 * 10^{-2}$

Question 2: [10 marks]

Write a Python program that asks the user for a temperature. Then, asks them what units, Celsius or Fahrenheit, the temperature is in. Your program should convert the temperature to the other unit. The conversion Formulas are: ***F* = 9C/5 + 32** and ***C* = 5 (*F* -32) /9**.

N.B: Assume that the entered letter is always an upper case. Hence, no need to check it.

Sample Output:

```
Enter the temperature: 50
Enter the unit: C/F: C
50.0  Celsius is  122.0  Fahrenheit
```

Answer: (10 marks. The tutor may allocate partial marks based on the validity and logical flow of the code)

```
temp = float(input("Enter the temperature: "))  # 2 marks
unit = input("Enter the unit: C/F: ")   # 1 mark
if unit == "C":                         # 1 mark
    fah = 9/5 * temp + 32               # 1.5 marks
    print(temp," Celsius is ",fah," Fahrenheit")   # 1 mark
else:                                               # 1 mark
    cel = 5/9*(temp -32)                            # 1.5 marks
    print(temp," Fahrenheit is ",cel," Celsius")   # 1 mark
```

or any other correct code

Question 3: [10 marks]

a- Consider the following code that is free of errors, with three hidden values that are replaced by the letters A, B, and C:

```
n=5
for i in range(n, 0, A):
   for j in  B (i):
      print('C ', end="")
   print('')
```

Note that the output is as shown below:

```
* * * * *
* * * *
* * *
* *
*
```

What are the pieces of code that are replaced by A, B, and C?

b- Based on the above code, write a Python program to construct the following pattern, using nested for loops.

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

Answer: (5 marks: 2+1.5+1.5)

a- A is **-1**, B is **range**, and C is ***

b-

```
n=5;
for i in range(n):
    for j in range(i):
        print ('* ', end="")
    print('')

for i in range(n,0,-1):
    for j in range(i):
        print('* ', end="")
    print('')
```

or any equivalent code

End of Questions