الجامعة العربية المفتوحة
Arab Open University

Faculty of Computer Studies

TM112

Introduction to Computing and Information Technology 2

MTA Exam

Fall 2019-2020
Date: TBA

Solution

Number of Exam Pages: (6) (including this cover sheet)	**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- The equivalent decimal number of the unsigned binary number 11001 is:

a- -9
b- +9
c- 25.
d- None of the above.

2- Which of the below statements is a feature of the Random-Access Memory?

a- It is volatile
b- It is non-volatile
c- Accessing any location in RAM takes the same amount of time.
d- Both a and c.

3- What is the best answer that describes the OR operator?

a. The output is always 1.
b. The output is 1 if any input is 1.
c. The output is 1, only if all inputs are 1.
d. Both b and c

4- The ____ provides an interface between the program and the rest of the computer system.

a- RAM
b- ALU
c- Hard Disk
d- Operating system

5- _____ is the term given to the storage devices that contain persistent data.

a- RAM
b- Cache Memories
c- Registers
d- Secondary Memory

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>

Two of the functions that the operating system provides are <u>Provision of a user interface</u> & <u>Management of memory</u>. Explain what each function means.

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

- **Provision of a user interface:** It provides us with a means of inputting data and instructions and displaying output in a form that users can understand.
- **Management of memory:** It is the job of the operating system to allocate appropriately sized areas of memory to each executing program, and to ensure that program instructions and data do not interfere with each other or with data and instructions of other programs.

  Or any other valid answer.

Question 2: [5 marks]

Consider the following code that is free of errors:

```
n=5
for i in range(n, 0, -1):
   for j in range(i):
      print('* ', end="")
   print('')
```

What will be the output of the above program?

Answer: (5 marks: 1 mark for each row)

The output:

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

Question 3: [5 marks]

Suppose that a teacher is designing a program that enters the following:

1- The name of the student

2- The student's grade

3- Number of attended lectures

The teacher wishes to add 5 marks to the grade as a bonus for students who have attended more than eight lectures.

a. Write the needed algorithm statement that will modify the grade accordingly and based on the number of attended lectures.(not the whole algorithm)

b. Is it necessary to have an else statement for the above task? Why?

Answer: (5 marks: 3+2)

a. If the number of attended lectures is above 8, add 5 to the grade.
b. No need to have an else statement as the grade will stay the same without any modification

Question 4: [6 marks]

Answer the following questions:

a- What is a Compiler?

b- List two programming languages that are designed to be compiled.

Answer: (6 marks: 4+2)

a- The compiler translates the entire source program into the machine language understood by the processor; this translation is referred to as the object code or object program.

b- Languages such as C, C++, and Visual Basic are designed to be compiled.

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 110011 to decimal. Show the steps.

b- Find the decimal equivalent of the sign-magnitude number 11000001. Show the steps.

c- Represent the number 0.0187 in scientific notation.

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

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

32 16 8 4 2 1

1 1 0 0 1 1

➔32+16+2+1= **51_{10}** (any other valid way of conversion is accepted)

b- [3 marks]

Sign 64 32 16 8 4 2 1

1 1 0 0 0 0 0 1

-(64 +1)= -65

c- [3 marks]

0.0187 will be represented as $1.87*10^{-2}$

Question 2: [10 marks]

An Exclusive-OR logic operator (**XOR**) with two inputs, **A** & **B**, produces an output equal to 1 only when the values of **A** and **B** are different.

a- Draw the truth table showing the desired outcomes of: 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: (10 marks)

1 + 1 + 4 + 4

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	

Question 3: [10 marks]

Given the following algorithm to calculate sum and average of numbers between 0 and n as follows:

- Accept an integer, n, from the user (suppose that the integer is always positive)
- Run a loop while n is greater than zero:
  - Add the current value of n to sum variable.
  - Also, decrement n by 1 in while loop body
- Calculate the average by dividing the sum by the numbers count.
- Print the value of the sum
- Print the value of the average.

Write a Python program that implements the above algorithm

Sample Output:

```
Enter a number:10
The sum using while loop is: 55
The average using a while loop is: 5.5
```

Answer: (10 marks:)

```
n = int(input('Enter a number:'))
count=n
sum=0
while (n > 0):
    sum += n
    n-=1
average  = sum / count
print ("The sum using while loop is:", sum)
print("The average using a while loop is:", average)
```

or any other correct code

End of Questions