الجامعة العربية المفتوحة
Arab Open University

Faculty of Computer Studies

T103/TM103: Computer Organization and Architecture

Mid-Term Assessment (MTA)
Solution

Fall 2018/2019

Date of MTA: TBA

Number of Exam Pages: (including this cover sheet) (4)	Time Allowed: (1.5) Hours
Total Grade: 60	

Instructions:

1- Write all your answers on the Answer Booklet.
2- Programmable calculators are not allowed.

Question Type	Number of questions	Max. Mark	Estimated time
Part 1: MCQ	5	10	**10 minutes**
Part 2: Problems and Short essay questions	5	50	**60 minutes**
Total		60	

Part 1: Multiple Choices questions (5 x 2 = 10 Marks)

Answer all the following questions by choosing the most correct statement

1- How many KB are in a 4GB RAM?

a. $4*10^{20}$.
b. $4*10^{9}$.
c. $4*2^{20}$.
d. $4*2^{30}$.

2- What is the complement of the expression **x+y'**?

a. xy'.
b. (xy)'.
c. x'y.
d. x'+y.

3- For a NOR gate, the output will be 1 if:

a. All inputs are 1.
b. All inputs are 0.
c. Any of the inputs is 0.
d. Both b and c.

4- What decimal value does the 8-bit binary number **10001110** have, if the computer is using an unsigned representation?

a. 14.
b. 142.
c. -14.
d. -142.

5- …..... is a type of temporary memory that can be accessed faster than RAM

a. ROM
b. HDD
c. Cache
d. None of the above.

PART 2: ALL QUESTIONS ARE REQUIRED [50 Marks]

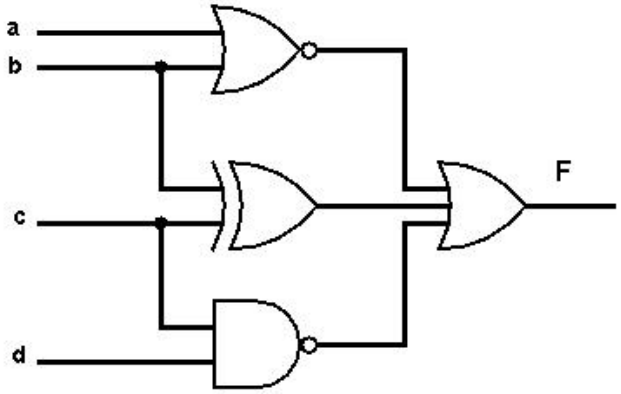
Remark for questions in Part 2:

All of the answers below for the questions are considered ideal answers to be considered in correction. However, the tutor should expect student's answers to be provided in different style and format. Kindly consider these answers and allow for partial marks to be awarded accordingly.

Q-1: Draw the combinational circuit that directly implements the following Boolean expression:

$$\mathbf{F(a, b, c, d) = \overline{(a + b)} + (b \oplus c) + (\overline{cd})}.$$ **[8 marks]**

Answer: (8 marks: 2 marks for each gate with proper labeling)



Q-2: Draw the truth table of the Half-Adder. **[6 marks]**

Answer: (6 marks: 3 marks for the sum output, 3 marks for the carry output)

Inputs		Outputs	
x	***y***	***Sum***	***Carry***
0	0	**0**	**0**
0	1	**1**	**0**
1	0	**1**	**0**
1	1	**0**	**1**

Q-3: Perform the following base conversions, showing the needed steps: **[13 marks]**

a) $(47.5)_{10}$ = $(57.4)_8$ [5 marks: 3 marks for showing the steps, 2 marks for the result]

b) $(1A.40)_{16}$ = $(26.25)_{10}$ [5 marks: 2 marks for showing the steps, 2 marks for the result]

c) $(E15)_{16}$ = $(1110\ 0001\ 0101)_2$ [3 marks: 1 mark for each hextet representation]

Q-4: Given the following function: **[10 marks]**

F(a,b,c) = a'b'c + a'bc' + a'bc + ab'c+ abc

a) Draw the K-map of the function, showing the groupings you have selected.
b) Write the simplified F.

Answer:

a) (6 marks: 4 marks for the proper positioning of 1's; 2 marks for proper grouping)

	b'c'	b'c	bc	bc'
a'	0	1	1	1
a	0	1	1	0

b) F= **c+ a'b** (4 marks. Deduct 1 mark for each redundant term)

Q-5: Represent the decimal number (**-68**) in: **[13 marks]**

a) Signed Magnitude 8-bit representation.
b) Two's Complement 8-bit representation.
c) Excess-16 Floating point representation.

8-bit signed magnitude	11000100	[2 marks]
two's complement	10111100	[4 marks]
floating format	1 | 1 0 1 1 1 | 1 0 0 0 1 0 0 0	[7 marks: 1+3+3]

End of the Assessment.