Assessment item 3
Assignment 1: Data Representation & Digital Logic
Value: 15%
Due date: 09-Apr-2017
Return date: 04-May-2017
Submission method options
Alternative submission method
Task

Total marks: 30

Answer the following Questions

Question 1

a) Determine the value of base x if $(211)_x = (6A)_{16}$ [5 marks]

b) Convert the followings: [3+3=6 marks]

i) 0xBAD into a decimal number

ii) 588_{10} into a 3-base number

c) Given a (very) tiny computer that has a word size of 6 bits, what are the smallest negative numbers and the largest positive numbers that this computer can represent in each of the following representations? [3 +3 = 6 marks]

i) One's complement

ii) Two's complement

Question 2.

a) Consider the following logic diagram of a combinational circuit where A, B, and C are inputs and Q is the output. Three 2-input AND gates and two 2-input OR gates are used in the circuit. It is possible to reduce some of the logic gates without changing the functionality of the circuit. Such component reduction results in higher operating speed (less delay time from input signal transition to output signal transition), less power consumption, less cost, and greater reliability. Construct a logic diagram of a circuit which does have the same function output with only two logic gates (instead of five). Please show the steps. [8 marks]

b) Using basic Boolean algebra identities for Boolean variables *A*, *B* and *C*, prove that *ABC*+ *ABC'* + *AB'C* + *A'BC* = *AB* + *AC* + *BC*. Please show all steps and mention the identities used. [5 marks]

Rationale

This assessment task covers topic 2 and 3, and has been designed to ensure that you are engaging with the subject content on a regular basis. More specifically it seeks to assess your ability to:

- be able to apply an understanding of data representations and calculations to practical situations;
- be able to apply Boolean algebra and digital logic to design and interpret complex digital circuits;

Marking criteria

Criteria	**HD (85%-100%)**	**DI (75%-84%)**	**CR (65%-74%)**	**PS (50%-64%)**	**FL (0%-49%)**
Comprehension of data representation and application of computer math calculations	All calculations were correct. Appropriate mathematical symbols were used, and all steps/workings were shown.	Almost all Calculations were correct except a minor error.	Most of the calculations are correct. However, few steps were omitted. The method used to solved the problem were correct, but there were one or two miscalculations.	At least half of the calculations were correct. Some incorrect answers were the result of errors at some stage of the calculation, which propagated with the next steps. Some of the steps showed the basic understanding the numbering system.	No attempt or most of the calculations were incorrect. Failed to show the steps of calculation. Either the answers were incorrect or the steps were wrong..
Application of Boolean algebra and digital logic and interpretation of complex circuits	The Boolean expressions are correct and minimised. All steps are explained. Correctly mentioned the Boolean identities. All identities were mentioned accurately.	Boolean expressions and algebraic calculations were correct, however few steps were not shown or only minor error.	Few minor error in applying the Boolean identities. Could reduce the number of logic gates, but not as much required by the question.	More than half of the Boolean expressions were correct. Applied Boolean identities but could not reach to the final step.	The Boolean equation, logic diagram and the truth tables were incorrect and they do not conform to the question.

Presentation

1. Please compose the answers in a document file (doc or docx format). Please do not submit in pdf formats. Please upload the document in the Turnitin within deadline.

2. The first page (cover page) of the document file should have the following information clearly mentioned:

a. Your full name
b. Your Student ID
c. Subject Code (ITC544)
d. Assessment item number and name (Assignment 1: Data Representation and Digital Logic)

3. Each page should have page numbers in "page x of y" format (including the cover page).

4. You DO NOT need to provide any references for any of the questions.

Assessment item 4
Assignment 2: MARIE and ISA
Value: 15%