UNIVERSITI TENAGA NASIONAL

College of Information Technology

BACHELOR OF COMPUTER SCIENCE (SYSTEM AND NETWORKING) (HONS).

FINAL EXAMINATION
SEMESTER II 2015/2016

DIGITAL LOGIC DESIGN
(CSNB163)

February 2016

Time allowed: 3 hours + 10 minutes for reading

INSTRUCTIONS TO CANDIDATES.

1. The total marks for this exam is 100 marks.
2. There are **TWO (2) SECTIONS** in this paper: Section A and Section B
3. Answer **ALL** questions in the answer booklet provided.

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE INSTRUCTED TO DO SO.

THIS QUESTION PAPER CONSISTS OF 7 PRINTED PAGES INCLUDING THIS PAGE.

SECTION A: SHORT ANSWER QUESTIONS (6 QUESTIONS, 30 MARKS)

<u>Instruction</u>: Answer ALL questions. You need to show all the required working steps to show how you arrive at the solutions.

Question 1

Convert the following into the given bases:

(a) 675_8 into decimal

[3 marks]

(b) 42_{10} into binary

[3 marks]

(c) ABC_{16} to octal

[3 marks]

(d) 100100111_2 to hexadecimal

[3 marks]

Question 2

Perform the subtraction operations below using 10's complement.

$54_{10} - 20_{10}$

[4 marks]

Question 3

Perform the subtraction operations below using 2's complement.

$11001101_2 - 10101011_2$

[4 marks]

Question 4

What is the difference between half adder and full adder?

[2 marks]

Question 5

(a) What is the different between standard form (e.g Sum of Product) and canonical form (e.g Sum of Minterm)?

[2 marks]

(b) What is the different between Sum of Minterm and Product of Maxterm?

[2 marks]

(c) Give one example of Standard Form

[2 marks]

Question 6

Identify the logic gates name based on the truth table below:

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

[2 marks]

SECTION B: STRUCTURED QUESTIONS (6 QUESTIONS, 70 MARKS)

<u>Instruction</u>: Answer ALL questions. You need to show all the required working steps to show how you arrive at the solutions.

Question 1

Given the equation F(A,B,C) = A'C + A'B + AB'C + BC

(a) Derive the Sum of Minterm from the equation

[4 marks]

(b) Derive the Product of Sum from the equation.

[2 marks]

(c) Minimize the expression of sum of minterm using karnaugh map.

[5 marks]

(d) Simplify the Sum of Minterm using Karnaugh Map.

[5 marks]

Question 2

Given the following equation F(A,B,C,D) = AB + CD + E

(a) Draw the circuit diagram for equation F.

[5 marks]

(b) Implement the function in question 2 (a) using NAND gates.

[5 marks]

Question 3

Figure 1 shows a combinational logic circuit:

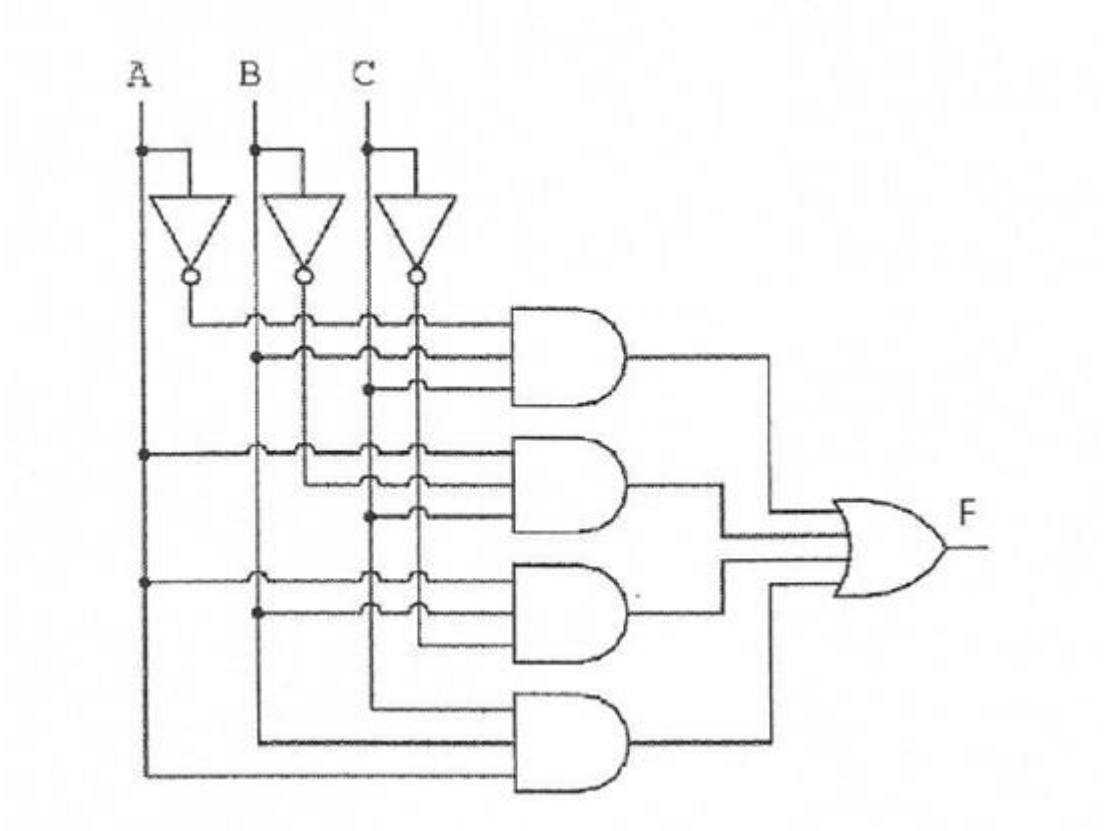

Figure 1

(a) Write the Boolean expression for F in the form of sum of minterm

[4 marks]

(b) Find the minimized expression for F

[4 marks]

(c) Draw the circuit of minimized expressions.

[4 marks]

(d) Draw the circuit of minimized expressions using NAND gates only.

[4 marks]

Question 4

Complete the truth table below and draw a logic circuit for each output.

[10 marks]

A	B	A>B	A<B	A=B
0	0			
0	1			
1	0			
1	1			

Question 5

What is a binary decoder?

[2 marks]

Question 6

(a) Describe the differences between sequential logic circuit and combinatorial logic circuit.

[4 marks]

(b) Differentiate between the following logic circuits:

i. SR latch

[2 marks]

ii. D latch

[2 marks]

(c) Explain the operation of the flip flop in the following Figure 2.

[8 marks]

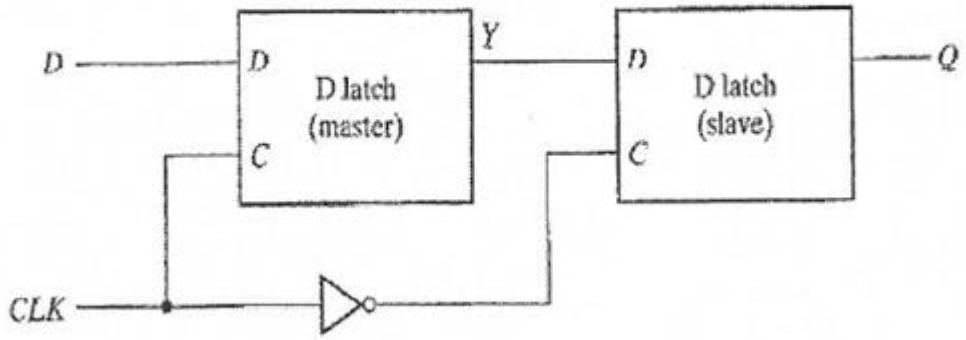

Figure 2

---End of Questions---