Philadelphia University

Faculty of Engineering

Student Name:	
Student Number:	
Serial Number:	

First Exam, First Semester: 2019/2020
Dept. of Computer Engineering

Course Title:	**Logic Circuits**	**Date:**	21/11/2019
Course No:	**630211**	**Time Allowed:**	50 Minutes
Lecturer:	Dr. Qadri Hamarsheh	**No. Of Pages:**	4

Instructions:

- **ALLOWED**: pens and drawing tools (**no red color**).
- **NOT ALLOWED**: Papers, calculators, literatures and any handouts. Otherwise, it will lead to the non-approval of your examination.
- **Shut down** Telephones, and other communication devices**.**

Please note:

- *This exam paper contains 4 questions totaling 20 marks*
- *Write your name and your matriculation number on every page of the solution sheets.*
- *All solutions together with solution methods (explanatory statement) must be inserted in the labelled position on the solution sheets.*
- *You can submit your exam after the first hour.*

Question 1* Multiple Choices:** ***(6 marks)

1) The **binary** number for $\mathbf{F7A9_{16}}$ is

a) **1110111110101001** **b)** **1111111010110001**
c) **1111011110101001** **d)** **1111011010101001**

2) When signed numbers are used in binary arithmetic, then which one of the following notations would have **unique** representation for **zero**?

a) **Sign-magnitude** **b)** **9's complement**
c) **1's complement** **d)** **2's complement**

3) The **signed magnitude** number $\mathbf{11001100_2}$ is equivalent to

a) $\mathbf{-76_{10}}$ **b)** $\mathbf{204_{10}}$
c) $\mathbf{CC_{16}}$ **d)** $\mathbf{1212_{10}}$

4) The **octal** equivalent of the number $\mathbf{(700)_{16}}$ is:

a) **1000** **b)** **3400**
c) **700** **d)** **7000**

5) The **octal** number represented by the **binary** number $\mathbf{110111011.101_2}$ is

a) **673.5** **b)** **31311.21**
c) **1BB** **d)** **none of the above**

6) In the **sum of products** functions $\mathbf{f(X,Y,Z) = \sum(2,3,4,5)}$, the **prime implicants** are

a) $\bar{X}Y, X\bar{Y}$
b) $\bar{X}Y, X\bar{Y}\bar{Z}, X\bar{Y}Z$
c) $\bar{X}Y\bar{Z}, \bar{X}YZ, X\bar{Y}$
d) $\bar{X}Y\bar{Z}, \bar{X}YZ, X\bar{Y}\bar{Z}, X\bar{Y}Z$

Identify the choice that best completes the statement or answers the question.

Familiar and Unfamiliar Problems Solving: *The aim of the questions in this part is to evaluate that the student has some basic knowledge of the key aspects of the lecture material and can attempt to solve familiar and unfamiliar problems of Boolean Expression Simplification, Karnaugh Maps and Logic Diagrams.*

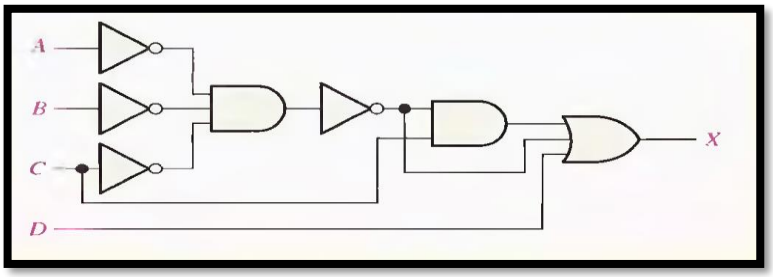
Question 2 Using Boolean algebra rules, do the following ***(5 marks)***

a) Simplify the following logic expression ***(2 marks)***

$$f = AB + A\bar{C} + C + AD + A\bar{B}C + ABC$$

Solution

b) Reduce (Simplify) the logic circuit in to a minimum form. ***(3 marks)***



Solution

Question 3 *(5 marks)*

a) Express the Boolean function *(3 marks)*

$$D = (\overline{A} + B)(\overline{B} + C)$$

a) As a **product of maxterms**.

b) As a **sum of minterms**.

Solution

b) Show the **Truth Table** for the Following function:- *(2 marks)*

$$f(w, x, y, z) = wx + xz + \overline{y}$$

Solution

Question 4 ***(4 marks)***

Use a **K-map** to simplify the Boolean expression

$$E = \overline{A}\,\overline{B}\,\overline{C}D + \overline{A}CD + \overline{A}\,\overline{C} + C$$

Solution

GOOD LUCK