



First Exam, Second Semester: 2018/2019

Dept. of Computer Engineering

Course Title:	Logic Circuits	Date:	24/03/2019
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:****(7 marks)****Identify the choice that best completes the statement or answers the question.**1) Convert the **octal** number  $35_8$  to **decimal**

- |       |       |
|-------|-------|
| a) 71 | b) 92 |
| c) 17 | d) 29 |

2) Binary  $10111111$  is \_\_\_\_\_ in hexadecimal.

- |               |               |
|---------------|---------------|
| a) $BF_{16}$  | b) $277_{16}$ |
| c) $10111111$ | d) $FB_{16}$  |

3) The **2's** complement of  $11100111$  is \_\_\_\_\_.

- |               |               |
|---------------|---------------|
| a) $11100110$ | b) $00011001$ |
| c) $00011000$ | d) $00011010$ |

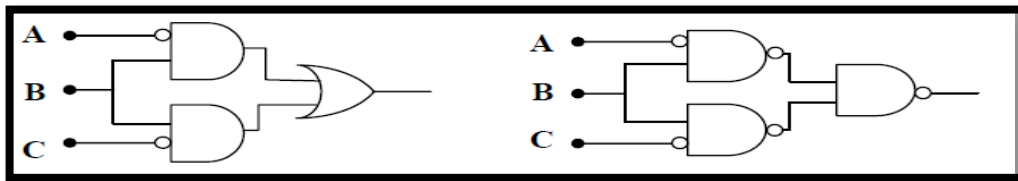
4) The **BCD** number for decimal  $347$  is

- |                       |                       |
|-----------------------|-----------------------|
| a) $1100\ 1011\ 1000$ | b) $1100\ 1011\ 0110$ |
| c) $0011\ 0100\ 0001$ | d) $0011\ 0100\ 0111$ |

5) **Universal** logic gates are:

- |                        |                      |
|------------------------|----------------------|
| a) <b>OR and AND</b>   | b) <b>NOT and OR</b> |
| c) <b>NAND and NOR</b> | d) <b>OR and XOR</b> |

6) The two circuits below are **equal**.



a) **True**

b) **False**

7) From the truth table below, determine the standard **SOP** expression.

Inputs			Output
A	B	C	X
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

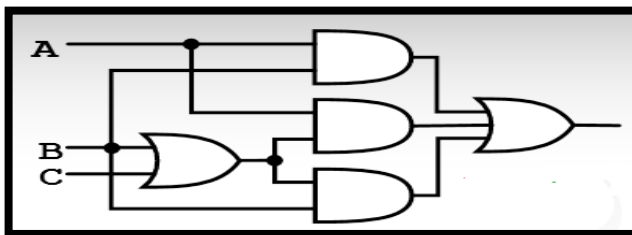
- a)  $X = \bar{A}\bar{B}\bar{C} + ABC + A\bar{B}C$
- b)  $X = ABC + ABC + ABC$
- c)  $X = A\bar{B}C + \bar{A}BC + AB\bar{C}$
- d)  $X = \bar{A}\bar{B}C + \bar{A}BC + AB\bar{C}$

**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**

(5 marks)

a) **Reduce (Simplify)** the logic circuit in to a minimum form (draw the simplified circuit).(3.5 marks)



**Solution**

b) Convert the **SOP** expression to an equivalent **POS** expression:

(1.5 marks)

$$\overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + \overline{A}BC + A\overline{B}C + ABC$$

**Solution**

Question 3

(4 marks)

Write **F** in Standard (canonical) Sum of Products Form (**SOP**) (Minterms).

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

**Solution**

**Question 4**

**(4 marks)**

Using a Karnaugh map, find minimal **SOP** expression for

$$f = \sum m(0, 2, 4, 6, 7, 10, 3, 14, 15)$$



**GOOD LUCK**