Philadelphia University
Faculty of Engineering

Marking Scheme

Exam Paper

BSc CE

Logic Circuits (630211)

First Exam First semester Date: 18/11/2018

Section 1

Weighting 20% of the module total

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Marking Scheme

Logic Circuits (630211)

The presented exam questions are organized to overcome course material through 6 questions.
The *all questions* are compulsory requested to be answered.

Marking Assignments

Question 1 This question is attributed with 8 marks if answered properly; the answers are as following:

1) Convert the hexadecimal number $\mathbf{14B_{16}}$ to binary.

a) $\mathbf{110101000001_2}$ **b)** $\mathbf{000101001101_2}$
c) $\mathbf{000101001011_2}$ **d)** $\mathbf{101101000001_2}$

2) $\mathbf{(734)_8 = (\ )_{16}}$

a) **1DC** **b)** **C1D**
c) **DC1** **d)** **1CD**

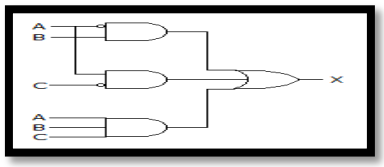
3) Convert $\mathbf{59.72_{10}}$ to **BCD**.

a) **111011** **b)** **0101100101110010**
c) **1110.11** **d)** **01011001.01110010**

4) The range of decimal numbers that can be written in 6 bit sign magnitude form:

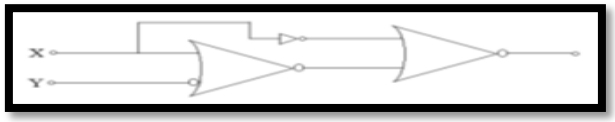
a) **-31 to 31** **b)** **0 to 64**
c) **-32 to 31** **d)** **-64 to 64**

5) The circuit given below implements the equation, $X = \overline{A}B + A\overline{C} + ABC$.



a) **True** **b)** **False**

6) The logic circuit shown can be minimized to



a) **A** **b)** **B**
c) **C** **d)** **D**

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) $X = \overline{A}\,\overline{B}\,\overline{C} + A\,B\,C + A\,\overline{B}\,C$
b) $X = A\,B\,C + A\,B\,C + A\,B\,C$
c) $X = A\,\overline{B}\,C + \overline{A}\,B\,C + A\,B\,\overline{C}$
d) $X = \overline{A}\,\overline{B}\,C + \overline{A}\,B\,C + A\,B\,\overline{C}$

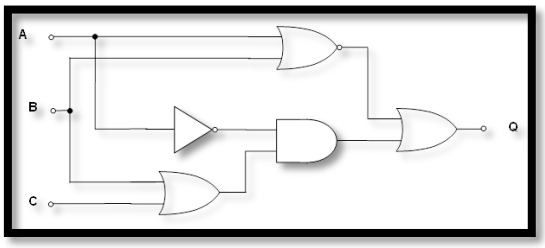
8) The K-map in the figure below shows the correct implementation of the expression **X= ACD + AB (CD + BC)**.

	$\overline{C}\,\overline{D}$	$\overline{C}\,D$	$C\,D$	$C\,\overline{D}$
$\overline{A}\,\overline{B}$	0	0	0	0
$\overline{A}\,B$	0	0	1	1
$A\,B$	0	0	0	1
$A\,\overline{B}$	0	0	0	1

a) **True** **b)** **False**

Question 2 This question is attributed with 2 marks if answered properly; the answers are as following:

Solution



Question 3 This question is attributed with 2 marks if answered properly; the answers are as following:

Solution

$$Q = B.C.(\overline{C} + D) + C.D + C + \overline{A}$$
$$Q = B.C.\overline{C} + B.C.D + C.D + C + \overline{A}$$
$$Q = B.0 + B.C.D + C.(D + 1) + \overline{A}$$
$$Q = B.C.D + C + \overline{A}$$
$$Q = C.(B.D + 1) + \overline{A}$$
$$Q = C.1 + \overline{A}$$
$$Q = C + \overline{A}$$

Question 4 This question is attributed with 2 marks if answered properly; the answers are as following:

Solution

SOP expression:

$$\overline{A}\,\overline{B}\,\overline{C} + \overline{A}B\overline{C} + A\overline{B}C + AB\overline{C}$$

POS expression:

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

Question 5 This question is attributed with 2 marks if answered properly; the answers are as following:

Solution

$x + yz = x(1) + (1)yz = x(y + y') + (x + x')yz = xy + xy' + xyz + x'yz$
$= xy(1) + xy'(1) + xyz + x'yz = xy(z + z') + xy'(z + z') + xyz + x'yz$
$= xyz + xyz' + xy'z + xy'z' + xyz + x'yz$
$= xyz + xyz' + xy'z + xy'z' + x'yz - - - (x + x = x)$
$= 111 + 110 + 101 + 100 + 011$
$= m7 + m6 + m5 + m4 + m3$
$x + yz = \sum m(3, 4, 5, 6, 7)$

Question 6 This question is attributed with 4 marks if answered properly; the answers are as following:

Solution