Marking Scheme

Exam Paper
BSc CE

Logic Circuits (630211)

First Exam
Second semester
Date: 24/03/2019

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 4 questions. The all questions are compulsory requested to be answered.

Marking Assignments

Question 1 This question is attributed with 7 marks if answered properly; the answers are as following:

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) OR and AND   b) NOT and OR   c) NAND and NOR   d) OR and XOR

6) The two circuits below are equal.

   a) True   b) False

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

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>A B C</td>
<td>X</td>
</tr>
<tr>
<td>0 0 0</td>
<td>X</td>
</tr>
<tr>
<td>0 0 1</td>
<td>1</td>
</tr>
<tr>
<td>0 1 0</td>
<td>0</td>
</tr>
<tr>
<td>0 1 1</td>
<td>1</td>
</tr>
<tr>
<td>1 0 0</td>
<td>0</td>
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<tr>
<td>1 0 1</td>
<td>0</td>
</tr>
<tr>
<td>1 1 0</td>
<td>1</td>
</tr>
<tr>
<td>1 1 1</td>
<td>0</td>
</tr>
</tbody>
</table>

   a) $X = \overline{A} \overline{B} \overline{C} + A B C + A \overline{B} \overline{C}$
   b) $X = A B C + A B C + A B C$
   c) $X = A \overline{B} \overline{C} + \overline{A} B C + A B C$
   d) $X = \overline{A} B C + \overline{A} B C + A B C$
Question 2 This question is attributed with 5 marks if answered properly; the answers are as following:

a) Solution

\[ AB+A(B+C)+B(B+C) \]

✓ (distributive law)

\[ \Rightarrow AB+AB+AC+BB+BC \]

✓ (BB=B)

\[ \Rightarrow AB+AB+AC+B+BC \]

✓ (AB+AB=AB)

\[ \Rightarrow AB+AC+B+BC \]

✓ (B+BC=B)

\[ \Rightarrow AB+AC+B \]

✓ (AB+B=B)

\[ \Rightarrow B+AC \]

b) Solution

\[(A+B+C)(A+B+C)(\overline{A}+\overline{B}+C)\]

Question 3 This question is attributed with 4 marks if answered properly; the answers are as following:

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

\[ = (AB)(C + D) + (B\overline{C}A) + (\overline{B}D\overline{A}) \]

\[ = (ABC) + (AB\overline{D}) + (B\overline{C}A) + (\overline{B}D\overline{A}) \]

\[ = (ABCD) + (ABC\overline{D}) + (AB\overline{C}\overline{D}) + (AB\overline{C}D) + (A\overline{B}\overline{C}D) + (\overline{A}\overline{B}\overline{C}D) + (\overline{AB}\overline{CD}) + (\overline{A}\overline{B}\overline{C}\overline{D}) \]

\[ = \sum_{A,B,C,D} (1, 3, 8, 9, 12, 14, 15) \]

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