

## EEE104 – Digital Systems - Interim Test 2007

Answer All questions by writing the answer in the appropriate box provided

<p>1 The output of a two input <b>XNOR</b> gate is HIGH when:</p> <p>(A) any input is HIGH      (B) all inputs are HIGH</p> <p>(C) all inputs are LOW      (D) any input is LOW</p> <p>(E) both answers (B) and (C)      (F) none of these</p>	<p>Write down a single letter for your choice.</p> <p style="text-align: center;"><b>E</b></p>										
<p>2 Complete the following Boolean expressions: (where A' represents NOT A)</p>	<p>i. <math>A + 0 = A</math>    ii. <math>A.A' = 0</math></p> <p>iii. <math>A + A' = 1</math>    iv. <math>A.1 = A</math></p>										
<p>3 Express the decimal number -37 as an eight bit binary 2's complement number.</p>	<p style="text-align: center;"><b>11011011</b></p>										
<p>4 Complete the truth table for the circuit below.</p> <div style="text-align: center;"> </div>	<table border="1" style="margin: auto;"> <thead> <tr> <th>A B</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>0 0</td> <td>1</td> </tr> <tr> <td>0 1</td> <td>0</td> </tr> <tr> <td>1 0</td> <td>1</td> </tr> <tr> <td>1 1</td> <td>0</td> </tr> </tbody> </table>	A B	F	0 0	1	0 1	0	1 0	1	1 1	0
A B	F										
0 0	1										
0 1	0										
1 0	1										
1 1	0										
<p>5 Express the function <math>F(A,B) = A \text{ XOR } B</math> as a fundamental product of sums.</p>	<p style="text-align: center;"><b><math>(A+B)(\bar{A}+\bar{B})</math></b></p>										
<p>6 Which one of the following describes a demultiplexer:</p> <p>(A) Converts information to a coded form.</p> <p>(B) Adds two bits to produce a sum and a carry.</p> <p>(C) Switches data from one input line to several output lines.</p> <p>(D) Converts coded information to a familiar form.</p> <p>(E) Stores binary data.</p> <p>(F) Switches digital data from several inputs to a single output.</p> <p>(G) Compares two data words for equality.</p> <p>(H) None of these.</p>	<p>Write down a single letter for your choice.</p> <p style="text-align: center;"><b>C</b></p>										
<p>7 What decimal number is represented by the binary coded decimal 100101100011</p>	<p style="text-align: center;"><b>963</b></p>										
<p>8 Write down De Morgan's Laws for two variables X and Y. (both are required)</p>	<p><math>\overline{X.Y} = \bar{X} + \bar{Y}</math></p> <p><math>\overline{X+Y} = \bar{X} . \bar{Y}</math></p>										

Please Turn Over

- 9 Write down the truth table for a 2-to-4 decoder with active low outputs.

$A_1 A_0$	$Z_3 Z_2 Z_1 Z_0$
0 0	1 1 1 0
0 1	1 1 0 1
1 0	1 0 1 1
1 1	0 1 1 1

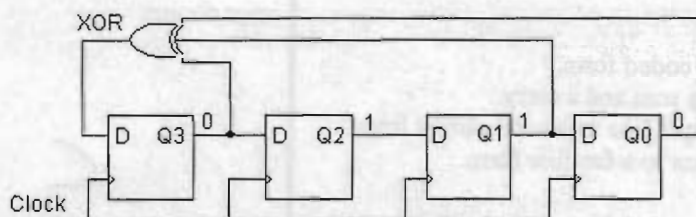
- 10 Fill in the three missing values of the Gray code sequence shown.

A B C
0 0 0
0 0 1
0 1 1
0 1 0
1 1 0
1 1 1
1 0 1
1 0 0

- 11 What is the frequency in KHz of a clock waveform that has a pulse width of 200ns and a duty cycle of 40%

2000 KHz

- 12 The linear feedback shift register shown below is in the state 0110. What will the new stable state be after the next two clock pulses have been applied?



Q3 = 1  
Q2 = 1  
Q1 = 0  
Q0 = 1

Examiner Use Only:

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