INSTRUCTIONS TO CANDIDATES

1. This answer booklet consists of SIX (6) printed pages. The last page is for your use only if you need more space to write your answers.

2. Fill in your Matriculation Number clearly on all odd-numbered pages.

MATRICULATION NUMBER (fill in with a pen): 

<table>
<thead>
<tr>
<th>Question</th>
<th>Total</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1-6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Q7</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Q8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Q9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Q10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Q11</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td></td>
</tr>
</tbody>
</table>
Write your answers for the MCQs in the boxes below.

1.  
2.  
3.  
4.  
5.  
6.  

Write your answers in the box/space provided.

7a. [4]

$TA =$

$TB =$

$TC =$

$TD =$

7b. [4]

[Diagram of a state transition graph]

Unused states

7c. [1]
8a. [4]

Matriculation number: 4-bit adder

\[
\begin{array}{cccccc}
C_{\text{in}} & X_3 & X_2 & X_1 & X_0 & C_{\text{out}} \\
S_3 & S_2 & S_1 & S_0 & \\
Y_3 & Y_2 & Y_1 & Y_0 & \\
\end{array}
\]

8b. [4]

A1H

\[
\begin{array}{cccc}
A & B & C & D \\
E & F & G & H \\
\end{array}
\]

Marks for Q8: /8
9a.i $s0 = 0x[1]

9a.ii $s0 = 0x[1]

9b. [3]

10a. [2] Best-case scenario:

10b. [2] Total cache miss =

10c. [2] Worst-case scenario:

10d. [2] Total cache miss =

10e. [3] Marks for Q9, Q10: /5 /11
11a. [2]

Total cycle needed is

11b. [2]

Total cycle needed is

11c. [3]

Total cycle needed is

11d. [4]

You may not need all the rows.

addi $s0, $zero, 0

lw $t1, 0($t0)

loop:

beq $t1, $zero, end

# DELAY SLOT

beq $zero, $zero, loop

# DELAY SLOT

del:

Marks for Q11: /11