INSTRUCTIONS TO CANDIDATES

1. This answer booklet consists of **EIGHT (8)** printed pages. The last two pages are 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>A</th>
<th>0</th>
<th>0</th>
</tr>
</thead>
</table>

For examiner’s use only:

<table>
<thead>
<tr>
<th>Question</th>
<th>Total</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1-8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Q9</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Q10</td>
<td>6</td>
<td></td>
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<tr>
<td>Q11</td>
<td>8</td>
<td></td>
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<tr>
<td>Q12</td>
<td>10</td>
<td></td>
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<tr>
<td>Q13</td>
<td>8</td>
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<tr>
<td><strong>Total</strong></td>
<td>50</td>
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</tbody>
</table>

Write your answers for the MCQs in the boxes below.

1. [ ] 2. [ ] 3. [ ] 4. [ ]

5. [ ] 6. [ ] 7. [ ] 8. [ ]
Write your answers in the box/space provided.

9a. [1]

9b. [5]

9c. [2]

9d. [2]
10. [6]
11a. [1] Cycle Time = _________ns, Total Cycles = _________, Execution time = _________ns

11b. [2] Cycle Time = _________ns, Total Cycles = _________, Execution time = _________ns

11c. [2] Cycle Time = _________ns, Total Cycles = _________, Execution time = _________ns

11d. Give the reordered code and improved execution time OR explain why no further improvement is possible
12a. [3]

<table>
<thead>
<tr>
<th>RegDst</th>
<th>RegWrite</th>
<th>ALUsrc</th>
<th>MemRead</th>
<th>MemWrite</th>
<th>MemToReg</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

12b. [1]


12c. [4]

A is connected to _________________________________
B is connected to _________________________________
Output is connected to _____________________________
Explanation:

12d. [1]

ShftDir =

12e. [1]
13a. [2]
Number of cold/compulsory misses: ___________
Number of conflict misses: __________

13b. [1]
Average cache access time = ________ ns

13c. [2]
Number of cold/compulsory misses: ___________
Number of conflict misses: __________

13d. [1]
Average cache access time = ________ ns

13e. [1]
Code X / Code Y / None will see an improvement. (Circle your answer.)

13f. [1]
Code X / Code Y / None will see an improvement. (Circle your answer.)