

# Revision Sheet

## A-Level Computer Science · Unit 16 System Software

12 vocabulary items · 24 marks of exam questions (4 questions)

*Part 1 · Vocabulary review answer key. Section A wants the exact English spelling.*

| Question | Answer                      | Marks |
|----------|-----------------------------|-------|
| 1        | grammar                     | 1     |
| 2        | process control block       | 1     |
| 3        | inter-process communication | 1     |
| 4        | shared memory               | 1     |
| 5        | virtual address space       | 1     |
| 6        | segmentation                | 1     |
| 7        | syntax analysis (parsing)   | 1     |
| 8        | abstract syntax tree        | 1     |
| 9        | Backus-Naur Form            | 1     |
| 10       | syntax diagram              | 1     |
| 11       | infix                       | 1     |
| 12       | Reverse Polish Notation     | 1     |

| 13                   | <p><b>One mark for each correct line connecting one stage of compilation to a description</b></p> <table> <tr> <th>Stage of compilation</th><th>Description</th></tr> <tr> <td>Lexical analysis</td><td>minimising a program's execution time and memory requirement</td></tr> <tr> <td>Syntax analysis</td><td>converting an intermediate representation of source code into an executable form</td></tr> <tr> <td>Code generation</td><td>converting a sequence of characters into a sequence of tokens</td></tr> <tr> <td>Optimisation</td><td>directly executing instructions written in a scripting language</td></tr> <tr> <td></td><td>using parsing algorithms to interpret the meaning of a sequence of tokens</td></tr> </table> | Stage of compilation | Description | Lexical analysis | minimising a program's execution time and memory requirement | Syntax analysis | converting an intermediate representation of source code into an executable form | Code generation | converting a sequence of characters into a sequence of tokens | Optimisation | directly executing instructions written in a scripting language |  | using parsing algorithms to interpret the meaning of a sequence of tokens |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-------------|------------------|--------------------------------------------------------------|-----------------|----------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------|--------------|-----------------------------------------------------------------|--|---------------------------------------------------------------------------|
| Stage of compilation | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                      |             |                  |                                                              |                 |                                                                                  |                 |                                                               |              |                                                                 |  |                                                                           |
| Lexical analysis     | minimising a program's execution time and memory requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                      |             |                  |                                                              |                 |                                                                                  |                 |                                                               |              |                                                                 |  |                                                                           |
| Syntax analysis      | converting an intermediate representation of source code into an executable form                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                      |             |                  |                                                              |                 |                                                                                  |                 |                                                               |              |                                                                 |  |                                                                           |
| Code generation      | converting a sequence of characters into a sequence of tokens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                      |             |                  |                                                              |                 |                                                                                  |                 |                                                               |              |                                                                 |  |                                                                           |
| Optimisation         | directly executing instructions written in a scripting language                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                      |             |                  |                                                              |                 |                                                                                  |                 |                                                               |              |                                                                 |  |                                                                           |
|                      | using parsing algorithms to interpret the meaning of a sequence of tokens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |             |                  |                                                              |                 |                                                                                  |                 |                                                               |              |                                                                 |  |                                                                           |

|       |                                                                                                                                                                                                                                                                                                                            |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14(a) | <p><b>One mark per point</b></p> <ul style="list-style-type: none"> <li>• Code generation</li> <li>• Optimisation</li> </ul>                                                                                                                                                                                               |
| 14(b) | <p><b>One mark per point (Max 2)</b></p> <ul style="list-style-type: none"> <li>• It checks that the code matches the grammar of the language // It checks that the tokens conform with the rules of the programming language</li> <li>• <b>Syntax errors</b> are reported</li> <li>• A parse tree is produced.</li> </ul> |

|           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15(a)     | <p><b>One mark for each marking point (Max 2)</b></p> <ul style="list-style-type: none"> <li>• <code>&lt;character&gt; ::=</code></li> <li>• <code>\$   %   &amp;   *   #</code></li> </ul> <p><b>Complete answer</b><br/> <code>&lt;character&gt; ::= \$   %   &amp;   *   #</code></p>                                                                                                                                                                                                                                                                                                                                                                              |
| 15(b)(i)  | For example: \$A9E3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 15(b)(ii) | <p><b>One mark for each marking point (Max 4)</b></p> <ul style="list-style-type: none"> <li>• <code>&lt;password&gt; ::= &lt;character&gt; ...</code></li> <li>• <code>... &lt;code&gt;</code></li> <li>• <code>&lt;code&gt; ::= ...</code></li> <li>• <code>... &lt;digit&gt;   &lt;capital_letter&gt;</code></li> <li>• <code>...   &lt;digit&gt;&lt;code&gt;   &lt;capital_letter&gt;&lt;code&gt;</code></li> </ul> <p><b>Complete answer</b><br/> <code>&lt;password&gt; ::= &lt;character&gt;&lt;code&gt;</code><br/> <code>&lt;code&gt; ::= &lt;digit&gt;   &lt;capital_letter&gt;   &lt;digit&gt;&lt;code&gt;   &lt;capital_letter&gt;&lt;code&gt;</code></p> |

| 16(a)              | <p><b>One mark for each correct line from Operating System Term to Description</b></p> <table border="1"> <thead> <tr> <th>OS term</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Multi-tasking</td><td>Using secondary storage to simulate additional main memory</td></tr> <tr> <td>Paging</td><td>Managing the processes running on the CPU</td></tr> <tr> <td>Interrupt handling</td><td>Managing the execution of many programs that appear to run at the same time</td></tr> <tr> <td>Scheduling</td><td>Locating non-contiguous blocks of data and relocating them</td></tr> <tr> <td>Virtual memory</td><td>Transferring control to another routine when a service is required</td></tr> <tr> <td></td><td>Reading/writing same-size blocks of data from/to secondary storage when required</td></tr> </tbody> </table> | OS term | Description | Multi-tasking | Using secondary storage to simulate additional main memory | Paging | Managing the processes running on the CPU | Interrupt handling | Managing the execution of many programs that appear to run at the same time | Scheduling | Locating non-contiguous blocks of data and relocating them | Virtual memory | Transferring control to another routine when a service is required |  | Reading/writing same-size blocks of data from/to secondary storage when required |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-------------|---------------|------------------------------------------------------------|--------|-------------------------------------------|--------------------|-----------------------------------------------------------------------------|------------|------------------------------------------------------------|----------------|--------------------------------------------------------------------|--|----------------------------------------------------------------------------------|
| OS term            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
| Multi-tasking      | Using secondary storage to simulate additional main memory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
| Paging             | Managing the processes running on the CPU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
| Interrupt handling | Managing the execution of many programs that appear to run at the same time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
| Scheduling         | Locating non-contiguous blocks of data and relocating them                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
| Virtual memory     | Transferring control to another routine when a service is required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
|                    | Reading/writing same-size blocks of data from/to secondary storage when required                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |
| 16(b)              | <p><b>One mark for each correct statement (Max 4)</b></p> <ul style="list-style-type: none"> <li>• An interpreter examines source code one statement at a time</li> <li>• Check each statement for errors</li> <li>• ...If no error is found the statement is executed</li> <li>• ...If an error is found this is reported and the interpreter halts</li> <li>• Interpretation is repeated for every iteration in repeated sections of code/in loops</li> <li>• Interpretation has to be repeated every time the program is run</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |         |             |               |                                                            |        |                                           |                    |                                                                             |            |                                                            |                |                                                                    |  |                                                                                  |