

## 2024 Sec 4 Express Computing P1 Marking Scheme

| Qn |     | Answers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Marks                 |
|----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1  | (a) | 203                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                     |
|    | (b) | <p>1 mark for each point</p> <ul style="list-style-type: none"> <li>• Divide 298 repeatedly by 16 and record the respective remainder, until the quotient is 0</li> <li>• For remainder 0 – 9, the hexadecimal digit is the same. For remainder 10 – 15, the hexadecimal digit is A to F respectively. The hexadecimal number is the remainder read from bottom up</li> <li>• <math>298 = 12A</math></li> </ul> <p>Alternate solution:</p> <ul style="list-style-type: none"> <li>• Convert to binary <ul style="list-style-type: none"> <li>- Divide 298 repeatedly by 2 and record the respective remainder until the quotient is 0</li> <li>- The binary number is the remainder read from bottom up</li> </ul> </li> <li>• From the rightmost, group 4 bits into 1 hexadecimal digit. Find the denary equivalent of each group of 4 bits. For 0 – 9, the hexadecimal digit is the same. For 10 – 15, the hexadecimal digit is A to F respectively.</li> <li>• <math>298 = 1\ 0010\ 1010</math><br/> <math>= 12A</math></li> </ul> | 3                     |
|    | (c) | <ul style="list-style-type: none"> <li>• Manufacturer's identity number</li> <li>• Device's serial number</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1<br>1                |
|    | (d) | <ul style="list-style-type: none"> <li>• <math>31_{16} = 0011\ 0001</math><br/> The last 8 bits of the device in (c) is not 0111 0001.</li> <li>• Hence, the device is (c) <u>is not</u> the unauthorised device</li> </ul> <p>Alternative solution:</p> <ul style="list-style-type: none"> <li>• <math>0111\ 0001 = 71_{16}</math><br/> The hexadecimal is not 31.</li> <li>• Hence, the device in (c) is not the unauthorised device</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1<br>1                |
| 2  |     | MID<br>SMALL<br>VLOOKUP<br>SUMIF<br>COUNTBLANK                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1<br>1<br>1<br>1<br>1 |

| 3                     |     | <table><tr><th>Items</th><th></th><th></th><th>Description</th></tr><tr><td></td><td></td><td></td><td>Stores data and instructions so they can be quickly accessed by the processor</td></tr><tr><td></td><td></td><td></td><td>Transports required information from processor to memory</td></tr><tr><td>Arithmetic logic unit</td><td></td><td></td><td>Intermediate or <u>final results</u> produced by the computer; usually in the form of processed data</td></tr><tr><td>Address bus</td><td></td><td></td><td>Processes data by performing basic mathematical and logical operations</td></tr><tr><td>Output</td><td></td><td></td><td>Transports required information between memory and processor</td></tr><tr><td>Memory</td><td></td><td></td><td>Stores data that will not be lost when power supply is interrupted</td></tr><tr><td></td><td></td><td></td><td>Follows instructions and decides when data should be stored, <u>received</u> or transmitted</td></tr></table> | Items                                                                                                |  |  | Description |  |  |  | Stores data and instructions so they can be quickly accessed by the processor |  |  |  | Transports required information from processor to memory | Arithmetic logic unit |  |  | Intermediate or <u>final results</u> produced by the computer; usually in the form of processed data | Address bus |  |  | Processes data by performing basic mathematical and logical operations | Output |  |  | Transports required information between memory and processor | Memory |  |  | Stores data that will not be lost when power supply is interrupted |  |  |  | Follows instructions and decides when data should be stored, <u>received</u> or transmitted | 4 |
|-----------------------|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|--|--|-------------|--|--|--|-------------------------------------------------------------------------------|--|--|--|----------------------------------------------------------|-----------------------|--|--|------------------------------------------------------------------------------------------------------|-------------|--|--|------------------------------------------------------------------------|--------|--|--|--------------------------------------------------------------|--------|--|--|--------------------------------------------------------------------|--|--|--|---------------------------------------------------------------------------------------------|---|
| Items                 |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Description                                                                                          |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
|                       |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Stores data and instructions so they can be quickly accessed by the processor                        |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
|                       |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Transports required information from processor to memory                                             |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
| Arithmetic logic unit |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Intermediate or <u>final results</u> produced by the computer; usually in the form of processed data |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
| Address bus           |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Processes data by performing basic mathematical and logical operations                               |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
| Output                |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Transports required information between memory and processor                                         |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
| Memory                |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Stores data that will not be lost when power supply is interrupted                                   |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
|                       |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Follows instructions and decides when data should be stored, <u>received</u> or transmitted          |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |
| 4                     | (a) | <p>Trojan horse [any one]</p> <ul style="list-style-type: none"><li>• a <u>computer program</u> that <u>pretends to be a harmless</u> or useful application</li><li>• once a trojan horse is run, it does something harmful such as <u>giving intruders unauthorised access</u> to the computer</li></ul> <p>Worm</p> <ul style="list-style-type: none"><li>• a <u>computer program</u> that <u>runs automatically and attempts to spread by sending copies of itself</u> to other computers</li></ul> <p>Pharming</p> <ul style="list-style-type: none"><li>• the <u>interception of requests</u> sent to a legitimate website and <u>redirection to a fake website</u> to steal personal data</li></ul>                                                                                                                                                                                                                                                                                   | <p>1</p> <p>1</p> <p>1</p>                                                                           |  |  |             |  |  |  |                                                                               |  |  |  |                                                          |                       |  |  |                                                                                                      |             |  |  |                                                                        |        |  |  |                                                              |        |  |  |                                                                    |  |  |  |                                                                                             |   |

|  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |   |
|--|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
|  | (b) | <p>Positive [any one]</p> <ul style="list-style-type: none"> <li>• better videos, simulations and collaboration tools makes lessons more engaging</li> <li>• sharing of information on the Internet makes education accessible to all</li> <li>• enables improved communication between learners and teachers</li> </ul> <p>Negative [any one]</p> <ul style="list-style-type: none"> <li>• leads to learners' shorter attention span</li> <li>• heavy investment in materials and infrastructure</li> <li>• need to retrain and pick up new skills</li> </ul> | 1 |
|  |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1 |
|  | (c) | The <u>crime of copying, distributing and/or using</u> proprietary software in a manner that is <u>not permitted by its licence</u>                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 |

| 5            | (a)        | Valid stores a Boolean that indicates if Value is a valid binary or not. If Value contains only '0' and/or '1', Valid is True. Otherwise, Valid is False [must be in the context of the question]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1<br>1       |       |                |             |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|--------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------|----------------|-------------|----------------|--|-------------|--|------|--------|--------|-------|-------|----------------|-------|----------------|-------|--|--|------|--|--|--|--|--|--|--|--|---|--|--|--|--|-------|--|-------|---|-------|--|--|--|--|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|---|
|              | (b)<br>(i) | <table><tr><th colspan="3">Main program</th><th colspan="3">Check ( )</th><th colspan="2">Success ( )</th></tr><tr><th>Data</th><th>Result</th><th>Output</th><th>Valid</th><th>Count</th><th>Value returned</th><th>Total</th><th>Value returned</th></tr><tr><td>13111</td><td></td><td></td><td>TRUE</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td></tr><tr><td></td><td>FALSE</td><td></td><td>FALSE</td><td>1</td><td>FALSE</td><td></td><td></td></tr><tr><td></td><td></td><td>Error</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>1 mark for main program<br/>1 mark for Check()</p> | Main program |       |                | Check ( )   |                |  | Success ( ) |  | Data | Result | Output | Valid | Count | Value returned | Total | Value returned | 13111 |  |  | TRUE |  |  |  |  |  |  |  |  | 0 |  |  |  |  | FALSE |  | FALSE | 1 | FALSE |  |  |  |  | Error |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 |
| Main program |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Check ( )    |       |                | Success ( ) |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Data         | Result     | Output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Valid        | Count | Value returned | Total       | Value returned |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| 13111        |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | TRUE         |       |                |             |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              | 0     |                |             |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              | FALSE      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | FALSE        | 1     | FALSE          |             |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |            | Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |       |                |             |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              |       |                |             |                |  |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |       |  |       |   |       |  |  |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |   |

| (b)          | (ii)                                                                                                                                                                                                                                                                                                    | <table><tr><th colspan="3">Main program</th><th colspan="3">Check ( )</th><th colspan="2">Success ( )</th></tr><tr><th>Data</th><th>Result</th><th>Output</th><th>Valid</th><th>Count</th><th>Value returned</th><th>Total</th><th>Value returned</th></tr><tr><td>10011</td><td></td><td></td><td>TRUE</td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>0</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>2</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td>3</td><td></td><td></td><td></td></tr><tr><td></td><td>TRUE</td><td></td><td></td><td>4</td><td>TRUE</td><td>0</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td></td></tr><tr><td></td><td>FALSE</td><td></td><td></td><td></td><td></td><td>3</td><td>FALSE</td></tr><tr><td></td><td></td><td>ERROR</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> <p>1 mark for main program<br/>1 mark for Check()<br/>1 mark for Success()</p> | Main program |       |                | Check ( )   |                |                     | Success ( ) |  | Data | Result | Output | Valid | Count | Value returned | Total | Value returned | 10011 |  |  | TRUE |  |  |  |  |  |  |  |  | 0 |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  | 3 |  |  |  |  | TRUE |  |  | 4 | TRUE | 0 |  |  |  |  |  |  |  | 1 |  |  |  |  |  |  |  | 2 |  |  | FALSE |  |  |  |  | 3 | FALSE |  |  | ERROR |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 3 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------|----------------|-------------|----------------|---------------------|-------------|--|------|--------|--------|-------|-------|----------------|-------|----------------|-------|--|--|------|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|---|--|--|--|--|------|--|--|---|------|---|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|---|--|--|-------|--|--|--|--|---|-------|--|--|-------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|
| Main program |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Check ( )    |       |                | Success ( ) |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Data         | Result                                                                                                                                                                                                                                                                                                  | Output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Valid        | Count | Value returned | Total       | Value returned |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| 10011        |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | TRUE         |       |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              | 0     |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              | 1     |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              | 2     |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              | 3     |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              | TRUE                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              | 4     | TRUE           | 0           |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
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|              |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |       |                | 2           |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              | FALSE                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |       |                | 3           | FALSE          |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
|              |                                                                                                                                                                                                                                                                                                         | ERROR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |       |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
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|              |                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |       |                |             |                |                     |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| (iii)        | <p>Function Success() is used to <u>count the number of '1's in Value and/or check if there are even or odd number of '1's.</u><br/>If it is <u>even</u>, the function returns <u>True</u>. If it is <u>odd</u>, the function returns <u>False</u>.</p> <p><u>Parity check</u> (even parity system)</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              |       |                |             |                | 1<br><br>1<br><br>1 |             |  |      |        |        |       |       |                |       |                |       |  |  |      |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |  |  |      |  |  |   |      |   |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |   |  |  |       |  |  |  |  |   |       |  |  |       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |

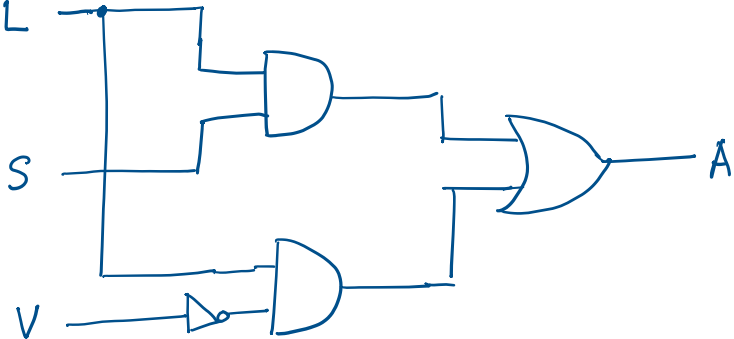
|   |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |
|---|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 6 | (a) | Compiler                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1          |
|   | (b) | [any two] <ul style="list-style-type: none"> <li>• Interpreter <u>translates and run one statement of the source code at a time</u> / translation occurs while the program is running / translation stops when syntax error is detected</li> <li>• The <u>interpreter program is needed every time the program is run</u></li> <li>• <u>Changes</u> to the source code <u>takes effect immediately</u></li> <li>• Interpreters usually offer an <u>interactive mode</u> which facilitates learning</li> </ul>                                                                                                                                                                                                                                                                                  | 2          |
|   | (c) | [any two] <ul style="list-style-type: none"> <li>• Compiler <u>translates the entire source code</u> into machine code</li> <li>• The <u>compiler program is not needed</u> to run the program</li> <li>• Any <u>changes to the source code requires recompilation</u> before the changes takes effect</li> <li>• Compilers usually <u>do not offer an interactive mode</u></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                         | 2          |
| 7 | (a) | [any two]<br>A LAN is a network of computing <u>devices connected within a small geographical area</u> (e.g. within a building) while a WAN is a network of <u>devices connected across geographical locations</u><br><br><u>Data transfer is faster in LAN</u> compared to a WAN<br><br>A WAN uses <u>more expensive and high-speed technology</u> than a LAN                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1<br><br>1 |
|   | (b) | [any 2]<br>Network hub<br>A device that <u>transmits received packets to all connected devices</u><br><br>Network interface controller<br>An internal component that provides the <u>hardware interface to enable the transfer of data between a device and a network</u><br><br>Network switch<br>A switch <u>connects multiple LANs that use the same protocol</u> so that the combined network can cover a larger physical area. A switch <u>uses MAC addresses to keep track of the devices that are connected to it.</u><br><br>Router<br>A device that <u>forwards packets between separate networks</u><br><br>Modem (spelling MUST be correct)<br>A device that <u>converts digital data into a form suitable for transmission and converts transmitted signals into digital data.</u> | 4          |

|   |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |
|---|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
|   |     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                         |
|   | (c) | <p>The server is a computer that <u>shares resources such as the children's personal data</u>, and <u>responds to requests</u> from devices used by staff and teachers. It also <u>manages the logins of the staff and teachers</u> in the different classrooms.</p> <p>When a teacher uses a computer to enter or retrieve children's information, the <u>computer initiates a connection to the server</u> requesting for information from the server and /or to save the information into the centralized database.</p>                                                                                                                                                                                                                    | <p>1(s)</p> <p>1(c)</p> |
| 8 | (a) | <p>Decomposition is a technique of <u>breaking down</u> a complex problem into <u>smaller and more manageable parts</u>. The <u>solutions to these parts</u> are then combined to <u>solve the original problem</u>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2                       |
|   | (b) | <p>[any two]</p> <p>Member ID (e.g. T1234567A)</p> <ul style="list-style-type: none"> <li>Length check: length of MemberID is 9 characters long</li> <li>Format check: MemberID is made up of letters in the first and last position, filled with digits in between)</li> </ul> <p>Class (e.g. 1A)</p> <ul style="list-style-type: none"> <li>Length check: length of class is 2 characters long</li> <li>Format check: first character is a digit followed by a letter</li> </ul> <p>Book title / author</p> <ul style="list-style-type: none"> <li>Presence check: the book title is entered</li> </ul> <p>Fine paid</p> <ul style="list-style-type: none"> <li>Range check: the amount paid is a numerical value greater than 0</li> </ul> | 2                       |
|   | (c) | <p>[any two]</p> <ul style="list-style-type: none"> <li>Receipt showing the books the students borrowed</li> <li>The result of a search based on title, author, genre, etc</li> <li>The number of books borrowed by a particular class/level</li> <li>List of overdue loans</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 2                       |
|   | (d) | <p>[any two]</p> <ul style="list-style-type: none"> <li>Students can borrow only books that are available, customers can only order items that are in stock</li> <li>Availability/copies of books are updated upon a loan/return, the stock is updated when customers order items</li> <li>Search for books; search for items</li> </ul> <p>[MUST describe the aspect in BOTH system]</p>                                                                                                                                                                                                                                                                                                                                                     | 2                       |



| 9                   | (a)            | <div>Line 13<ul style="list-style-type: none"><li>OUTPUT "Credit card no: ", Remove(CardNum)</li></ul></div> <div>Line 4<ul style="list-style-type: none"><li>While Counter &lt; LEN(Num)</li><li>While Counter &lt;= LEN(Num)-1</li></ul></div> <div>Line 6<ul style="list-style-type: none"><li>NewNum += Num[Counter]</li></ul></div> <div>Line 10<ul style="list-style-type: none"><li>RETURN NewNum</li></ul></div>                                                                                                                                             | <div>1</div> <div>1</div> <div>1</div> <div>1</div> |           |        |                |       |                |      |                |   |
|---------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------|--------|----------------|-------|----------------|------|----------------|---|
|                     | (b)            | <div>Run-time error<ul style="list-style-type: none"><li>An error that occurs <u>while the program is running</u>, usually causing the <u>program to hang or crash</u></li></ul></div> <div>Syntax error<ul style="list-style-type: none"><li>An error that is detected <u>by the translator</u> due to incorrect source code that <u>does not follow the rules of the language</u></li></ul></div>                                                                                                                                                                  | <div>1</div> <div>1</div> <div>1</div> <div>1</div> |           |        |                |       |                |      |                |   |
|                     | (c)            | Test and refine code                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1                                                   |           |        |                |       |                |      |                |   |
|                     | (d)            | <table><tr><th>Test case condition</th><th>Test data</th></tr><tr><td>Normal</td><td>1111-2222-3333</td></tr><tr><td rowspan="3">Error</td><td>1111 2222 3333</td></tr><tr><td>1234</td></tr><tr><td>aaaa-bbbb-cccc</td></tr></table> <div>1 mark for each test data; must be for different types of error<ul style="list-style-type: none"><li>14 characters – no '-' in the correct position, not digits in the correct positions</li><li>Not 14 characters</li><li>Did not accept empty string (since there are other possible clearer responses)</li></ul></div> | Test case condition                                 | Test data | Normal | 1111-2222-3333 | Error | 1111 2222 3333 | 1234 | aaaa-bbbb-cccc | 4 |
| Test case condition | Test data      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                     |           |        |                |       |                |      |                |   |
| Normal              | 1111-2222-3333 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                     |           |        |                |       |                |      |                |   |
| Error               | 1111 2222 3333 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                     |           |        |                |       |                |      |                |   |
|                     | 1234           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                     |           |        |                |       |                |      |                |   |
|                     | aaaa-bbbb-cccc |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                     |           |        |                |       |                |      |                |   |



| 10 | (a)(i) | $A = (L \text{ AND } S) \text{ OR } (L \text{ and NOT } V)$ Or $A = L \text{ AND } (S \text{ OR NOT } V)$                                                                                                                                                                                                                                                                                                                                                                                                                  | 1 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
|----|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---------------|---|---|---|--|---|---|---|--|---|---|---|--|---|---|---|--|---|---|
|    | (ii)   |  <p>1mark for each gate</p>                                                                                                                                                                                                                                                                                                                                                                                                              | 4 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
|    | (b)(i) | <table border="1"> <thead> <tr> <th>A</th><th>B</th><th>Working space</th><th>X</th></tr> </thead> <tbody> <tr> <td>0</td><td>0</td><td></td><td>0</td></tr> <tr> <td>0</td><td>1</td><td></td><td>1</td></tr> <tr> <td>1</td><td>0</td><td></td><td>1</td></tr> <tr> <td>1</td><td>1</td><td></td><td>1</td></tr> </tbody> </table> <p>1 mark for each correct adjacent rows</p>                                                                                                             | A | B | Working space | X | 0 | 0 |  | 0 | 0 | 1 |  | 1 | 1 | 0 |  | 1 | 1 | 1 |  | 1 | 2 |
| A  | B      | Working space                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | X |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
| 0  | 0      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
| 0  | 1      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
| 1  | 0      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
| 1  | 1      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
|    | (ii)   | OR gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |
| 11 |        | <pre>def removeLargest(lst):     largest = lst[0]     for num in lst:         if num &gt; largest:             largest = num      new_list = []     for num in lst:         if num != largest:             new_list = new_list + [num]      print(new_list)</pre> <p>1m – function signature (with parameter)<br/> 1m – correct algorithm to get largest with use of loop<br/> 1m – correct algorithm to form new list with use of loop<br/> 1m – print new list<br/> 1m – initialization (for largest and empty list)</p> | 5 |   |               |   |   |   |  |   |   |   |  |   |   |   |  |   |   |   |  |   |   |