



Cambridge  
International  
AS & A Level

**Cambridge International Examinations**  
Cambridge International Advanced Subsidiary and Advanced Level

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**COMPUTER SCIENCE**

**9608/32**

Paper 3 Written Paper

**May/June 2017**

MARK SCHEME

Maximum Mark: 75

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**Published**

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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This document consists of **7** printed pages.

| Question  | Answer                                                                                                                                                                                                                                                                                                                                                                          | Marks |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| 1(a)(i)   | DECLARE NewFriend : MyContactDetail                                                                                                                                                                                                                                                                                                                                             | 1     |
| 1(a)(ii)  | NewFriend.HouseNumber ← 129                                                                                                                                                                                                                                                                                                                                                     | 1     |
| 1(b)      | <p><b>Declaration of Name, Area, HouseNumber</b> 1</p> <p><b>Inclusion of three correct values for Area</b> 1</p> <p><b>Inclusion of correct range for HouseNumber</b> 1</p> <p>For example:</p> <pre> TYPE MyContactDetail     DECLARE Name      : STRING     DECLARE Area      : (uptown, downtown, midtown)     DECLARE HouseNumber : 1..499 ENDTYPE </pre> <p>1 &amp; 1</p> | 3     |
| 1(c)(i)   | 4402                                                                                                                                                                                                                                                                                                                                                                            | 1     |
| 1(c)(ii)  | 33                                                                                                                                                                                                                                                                                                                                                                              | 1     |
| 1(c)(iii) | 3427                                                                                                                                                                                                                                                                                                                                                                            | 1     |
| 1(c)(iv)  | TRUE                                                                                                                                                                                                                                                                                                                                                                            | 1     |
| 1(d)(i)   | IPointer ← @MyInt2                                                                                                                                                                                                                                                                                                                                                              | 1     |
| 1(d)(ii)  | MyInt1 ← 33                                                                                                                                                                                                                                                                                                                                                                     | 1     |
| 1(d)(iii) | IPointer^ ← MyInt2                                                                                                                                                                                                                                                                                                                                                              | 1     |

| Question  | Answer                                                                                                                                                                                                                                                                                | Marks                                |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| 2(a)(i)   | Pharming                                                                                                                                                                                                                                                                              | 1                                    |
| 2(a)(ii)  | Phishing                                                                                                                                                                                                                                                                              | 1                                    |
| 2(a)(iii) | A <u>standalone/independent</u> piece of malicious software that can replicate/duplicate itself                                                                                                                                                                                       | 1<br>1<br>2                          |
| 2(b)      | No up-to-date anti-virus (or equivalent) software (used) / Regular virus scans not performed<br>No firewall<br>Operating system not up-to-date/obsolete<br>Attachments/suspicious links in emails clicked on<br>Clicking on website with an out of date security certificate<br>max 2 | 2                                    |
| 2(c)(i)   | (Certificate) serial number<br>Certificate Authority (that issued certificate)<br>Valid date(s) // Date of expiry<br>Subject name (name of user/owner, computer, network device)<br>Subject public key<br>Version (Number)<br>Hashing algorithm (data or signature)<br>max 3          | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>3 |
| 2(c)(ii)  | CA uses hashing algorithm ..<br>To generate a message digest from the particular certificate<br>Message digest is encrypted with CA's private key                                                                                                                                     | 1<br>1<br>1<br>3                     |
| 2(c)(iii) | Need to know that the certificate is genuine (and has not been altered)<br>// Authenticate or verify it (came from the CA)                                                                                                                                                            | 1                                    |

| Question  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Marks |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---------------|---|---------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------|-------------------|---|
| 3(a)      | <div><div><div><div><div><math>S = ( \bar{P} + (\overline{Q+R}) ) . R</math></div><div><math>\bar{P}</math></div><div><math>(\overline{Q+R})</math></div><div><math>(\bar{P} + (\overline{Q+R}) )</math></div><div><math>. R</math> (must be outside final brackets)</div></div></div><div>Or</div><div><div><math>\bar{P}</math></div><div><math>(\overline{Q+R})</math></div><div><math>\bar{P} + (\overline{Q+R})</math></div><div><math>(.....) . R</math></div></div></div><div><div>1</div><div>1</div><div>1</div><div>1</div><div>1</div><div>1</div><div>1</div><div>1</div></div></div> <tr><td>3(b)</td><td><table><tr><th>P</th><th>Q</th><th>R</th><th>Working space</th><th>S</th></tr><tr><td>0</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr></table><div>2 marks all correct, 1 mark seven correct, 0 marks six or fewer correct</div></td><td>2</td></tr> <tr><td>3(c)(i)</td><td><div><div><div><div><div></div><div>00</div><div>01</div><div>11</div><div>10</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>1</div><div>1</div><div>1</div><div>0</div><div>0</div></div></div></div></div></td><td>1</td></tr> <tr><td>3(c)(ii)</td><td><div><div><div><div><div></div><div>00</div><div>01</div><div>11</div><div>10</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>1</div><div>1</div><div>1</div><div>0</div><div>0</div></div></div></div></div></td><td>1</td></tr> <tr><td>3(c)(iii)</td><td><math>S = \bar{P} . R</math></td><td>1</td></tr> | 3(b)  | <table><tr><th>P</th><th>Q</th><th>R</th><th>Working space</th><th>S</th></tr><tr><td>0</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr></table> <div>2 marks all correct, 1 mark seven correct, 0 marks six or fewer correct</div> | P | Q             | R | Working space | S | 0 | 0 | 0 |   | 0 | 0 | 0 | 1 |   | 1 | 0 | 1 | 0 |   | 0 | 0 | 1 | 1 |   | 1 | 1 | 0 | 0 |   | 0 | 1 | 0 | 1 |   | 0 | 1 | 1 | 0 |   | 0 | 1 | 1 | 1 |   | 0 | 2 | 3(c)(i) | <div><div><div><div><div></div><div>00</div><div>01</div><div>11</div><div>10</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>1</div><div>1</div><div>1</div><div>0</div><div>0</div></div></div></div></div> | 1 | 3(c)(ii) | <div><div><div><div><div></div><div>00</div><div>01</div><div>11</div><div>10</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>1</div><div>1</div><div>1</div><div>0</div><div>0</div></div></div></div></div> | 1 | 3(c)(iii) | $S = \bar{P} . R$ | 1 |
| 3(b)      | <table><tr><th>P</th><th>Q</th><th>R</th><th>Working space</th><th>S</th></tr><tr><td>0</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr><tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>1</td><td>1</td><td></td><td>0</td></tr></table> <div>2 marks all correct, 1 mark seven correct, 0 marks six or fewer correct</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | P     | Q                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | R | Working space | S | 0             | 0 | 0 |   | 0 | 0 | 0 | 1 |   | 1 | 0 | 1 | 0 |   | 0 | 0 | 1 | 1 |   | 1 | 1 | 0 | 0 |   | 0 | 1 | 0 | 1 |   | 0 | 1 | 1 | 0 |   | 0 | 1 | 1 | 1 |   | 0 | 2 |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| P         | Q                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | R     | Working space                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | S |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 0         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 0         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 0         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 0         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 1         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 1         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 1         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 1         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 3(c)(i)   | <div><div><div><div><div></div><div>00</div><div>01</div><div>11</div><div>10</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>1</div><div>1</div><div>1</div><div>0</div><div>0</div></div></div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 3(c)(ii)  | <div><div><div><div><div></div><div>00</div><div>01</div><div>11</div><div>10</div></div><div><div>0</div><div>0</div><div>0</div><div>0</div><div>0</div></div><div><div>1</div><div>1</div><div>1</div><div>0</div><div>0</div></div></div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |
| 3(c)(iii) | $S = \bar{P} . R$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |   |               |   |               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |         |                                                                                                                                                                                                                                                           |   |          |                                                                                                                                                                                                                                                           |   |           |                   |   |

| Question | Answer                                                                                                                                                                                                                                                                                                      | Marks                                     |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 3(d)     | $S = (\bar{P} + (\overline{Q+R})) \cdot R$ $S = (\bar{P} + (\overline{Q \cdot R})) \cdot R \quad // \quad \bar{P} \cdot R + (\overline{Q+R}) \cdot R$ $S = (\bar{P} \cdot R) + (\overline{Q \cdot R} \cdot R)$ $S = \bar{P} \cdot R + \overline{Q} \cdot 0$ $S = \bar{P} \cdot R + 0$ $S = \bar{P} \cdot R$ | <b>3</b><br><br>1<br>1<br><br>)<br>)<br>1 |

| Question  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Marks                            |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| 4(a)      | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <b>File organisation method</b><br/><br/> <div style="border: 1px solid black; padding: 5px; margin: 5px;">random</div><br/> <div style="border: 1px solid black; padding: 5px; margin: 5px;">serial</div><br/> <div style="border: 1px solid black; padding: 5px; margin: 5px;">sequential</div> </div> <div style="text-align: center;"> <b>File access method</b><br/><br/> <div style="border: 1px solid black; padding: 5px; margin: 5px;">sequential</div><br/> <div style="border: 1px solid black; padding: 5px; margin: 5px;">direct</div> </div> </div> <p>1 mark for random correct<br/>1 mark for serial correct<br/>2 marks for sequential correct (1 per correct line)</p> | <b>4</b>                         |
| 4(b)(i)   | File A:<br>Serial<br>Meter readings are submitted over time // added to the end of file<br>Stored chronologically                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>3</b><br><br>1<br>1<br>1      |
| 4(b)(ii)  | File B:<br>Sequential<br>Any two points from:<br>Each customer has a unique account number<br>Sorted on Account number<br>High hit rate // Suitable for batch processing monthly statements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>3</b><br><br>1<br>1<br>1<br>1 |
| 4(b)(iii) | File C:<br>Random<br>Login without waiting // Random organisation allows fastest direct access to required record<br>Low hit rate // Suitable for access to individual records                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>3</b><br><br>1<br>1<br>1      |

| Question                 | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Marks        |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|--|-------------------|-------------------|--|------------------|--------------------------|---|-----------------|------------------------|---|--------------------------|----------------------------|---|----------|
| 5(a)                     | <table> <tr> <th>Option 1</th><th>Option 2</th><th></th></tr> <tr> <td>Application Layer</td><td>Application Layer</td><td></td></tr> <tr> <td><b>Transport</b></td><td><b>Transport (Layer)</b></td><td>1</td></tr> <tr> <td><b>Internet</b></td><td><b>Network (Layer)</b></td><td>1</td></tr> <tr> <td><b>Network Interface</b></td><td><b>(Data) Link (Layer)</b></td><td>1</td></tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Option 1     | Option 2 |  | Application Layer | Application Layer |  | <b>Transport</b> | <b>Transport (Layer)</b> | 1 | <b>Internet</b> | <b>Network (Layer)</b> | 1 | <b>Network Interface</b> | <b>(Data) Link (Layer)</b> | 1 | <b>3</b> |
| Option 1                 | Option 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| Application Layer        | Application Layer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| <b>Transport</b>         | <b>Transport (Layer)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1            |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| <b>Internet</b>          | <b>Network (Layer)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1            |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| <b>Network Interface</b> | <b>(Data) Link (Layer)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1            |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| 5(b)(i)                  | Peer-to-peer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1</b>     |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| 5(b)(ii)                 | File sharing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>1</b>     |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| 5(b)(iii)                | <p>Any four points from the following:</p> <ul style="list-style-type: none"> <li>• Torrent descriptor file is made available</li> <li>• File to be shared is split into pieces</li> <li>• BitTorrent client software made available to other peers / users / computers</li> </ul> <p>Allowing them to work as seeds or leeches.</p> <p>A peer can act as a ‘seed’ – used to upload pieces of a file</p> <p>Peer downloading file can get pieces from different seeds simultaneously</p> <ul style="list-style-type: none"> <li>• Once a peer has a piece of the file it can become a seed for the parts downloaded</li> </ul> <p>Leeches download much more than they upload</p> <ul style="list-style-type: none"> <li>• Central server called a tracker keeps records of all the peers (‘swarm’) and the parts of the file they have</li> </ul> <p>Can pause and restart at any time.</p> | <b>Max 4</b> |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |
| 5(c)                     | <p>Any two protocols from:</p> <p>HTTP/HTTPS ... 1</p> <p>Used for transfer of web pages from server to client 1</p> <p>FTP ... 1</p> <p>Used for interactive file transfer 1</p> <p>SMTP ... 1</p> <p>Used for sending email messages 1</p> <p>POP3 ... 1</p> <p>Used for incoming email messages 1</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Max 4</b> |          |  |                   |                   |  |                  |                          |   |                 |                        |   |                          |                            |   |          |

| Question  | Answer                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Marks                                               |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 6(a)(i)   | Monitoring system                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                   |
| 6(a)(ii)  | There is no element of ‘control’ in the system // the system does not alter conditions in the building if sensors triggered                                                                                                                                                                                                                                                                                                                                                           | 1                                                   |
| 6(a)(iii) | Any two sensors from:<br>Sound / acoustic<br>Pressure<br>Infra-red / motion /proximity<br>Temperature / Thermal<br>Light<br>Smoke<br>Tilt                                                                                                                                                                                                                                                                                                                                             | Max 2                                               |
| 6(b)(i)   | <pre> 01 ForEver ← FALSE //TRUE 02 REPEAT 03   FOR FloorCounter ← 1 TO NoOfFloors 04     FOR SensorCounter ← 1 TO NumberOfSensors 05       READ Sensor(SensorCounter) on Floor(FloorCounter) 06       IF Sensor value outside range 07         THEN 08           OUTPUT "Problem on Floor ", FloorCounter 09         ENDIF 10       ENDFOR 11     ENDFOR 12   // 13   // Delay loop 14   // Delay loop 15   // 16 UNTIL ForEver/Forever = TRUE // NOT ForEver / ForEver = FALSE</pre> | <div>1</div> <div>1</div> <div>1</div> <div>3</div> |
| 6(b)(ii)  | FOR Counter ← 1 TO 999999 (any “large” number)<br>ENDFOR                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                                   |
| 6(b)(iii) | To allow time to elapse between readings                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                                   |
| 6(c)(i)   | To identify which <u>sensor</u> caused the interrupt                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                                   |
| 6(c)(ii)  | Display appropriate warning message<br>On the correct monitor                                                                                                                                                                                                                                                                                                                                                                                                                         | <div>1</div> <div>1</div> <div>2</div>              |