Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/31**

Paper 3 Written Paper **May/June 2017**

MARK SCHEME

Maximum Mark: 75

Published

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Question	Answer	Marks
1(a)(i)	`DECLARE Book  : LibraryBookRecord`	**1**
1(a)(ii)	`Book.Title ← "Dune"`	**1**

1(b)	`TYPE LibraryBookRecord`
	`  DECLARE ISBN  : INTEGER`
	`  DECLARE Title  : STRING`
	`  DECLARE Genre  : (Fiction, Non-Fiction)` **1**
	`  DECLARE NumberOfLoans : 1 .. 99` **1**
	`ENDTYPE`
	mark for correct declaration and first two fields (**note**: only if attempt at modification) **1**
		3

1(c)(i)	6715	**1**
1(c)(ii)	8216	**1**
1(c)(iii)	88	**1**
1(c)(iv)	`FALSE`	**1**
1(d)(i)	`Temp2 ← 22`	**1**
1(d)(ii)	`IntPointer ← @Temp1`	**1**
1(d)(iii)	`IntPointer^ ← Temp2`	**1**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)(i)</td><td>Worm</td><td>1</td></tr>
<tr><td>2(a)(ii)</td><td>Phishing</td><td>1</td></tr>
<tr><td>2(a)(iii)</td><td>Malicious software that replicates by inserting a copy of itself (1)
into a file of data (1)</td><td>2</td></tr>
<tr><td>2(b)</td><td>Example:
No <u>up-to-date</u> anti-virus (or equivalent) software
Regular virus scans not performed
Operating system not up-to-date
Attachments/suspicious links clicked on
1 mark for any valid vulnerability</td><td>Max 2</td></tr>
<tr><td>2(c)(i)</td><td>public</td><td>1</td></tr>
<tr><td>2(c)(ii)</td><td>Bob sends his <u>digital certificate</u>
Digital certificate contains Bob’s public key
Successful decryption of certificate using CA’s public key provides legitimacy
1 mark for any valid point – max 2</td><td>2</td></tr>
<tr><td>2(c)(iii)</td><td><table>
<tr><th>The person performing the action</th><th>What that person does</th><th></th></tr>
<tr><td>Anna</td><td>Requests Bob’s public key.</td><td></td></tr>
<tr><td>Bob</td><td>Sends Anna his public key.</td><td>1</td></tr>
<tr><td>Anna</td><td>Encrypts email with <u>Bob’s public key</u>.</td><td>1</td></tr>
<tr><td>Anna</td><td>Sends the email to Bob.</td><td></td></tr>
<tr><td>Bob</td><td>Decrypts email.
Using his private key.</td><td>1
1</td></tr>
</table></td><td>4</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>$X = A.(\overline{B} + (B . C))$
$B.C$ 1
$\overline{B} + B.C$ 1
$A.$ 1</td><td>3</td></tr>
<tr><td>3(b)</td><td>
<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working Space</th><th>X</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>0</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>0</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td></td><td>1</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>1</td></tr>
</table>
1 mark first four entries, 1 mark for the last four entries</td><td>2</td></tr>
<tr><td>3(c)(i)</td><td>
<table>
<tr><th></th><th></th><th colspan="4">AB</th></tr>
<tr><th></th><th></th><th>00</th><th>01</th><th>11</th><th>10</th></tr>
<tr><td rowspan="2">C</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
</table></td><td>1</td></tr>
<tr><td>3(c)(ii)</td><td>
<table>
<tr><th></th><th></th><th colspan="4">AB</th></tr>
<tr><th></th><th></th><th>00</th><th>01</th><th>11</th><th>10</th></tr>
<tr><td rowspan="2">C</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1</td><td>1</td></tr>
</table></td><td>2</td></tr>
<tr><td>3(c)(iii)</td><td>$X = A.\overline{B} + A.C$
1 1</td><td>2</td></tr>
<tr><td>3(d)</td><td>$X = A.(\overline{B} + (B . C))$
$X = A.(\overline{B} + C)$ 1
$X = A.\overline{B} + A.C$ 1 (dependent mark – must be correct outcome from previous line)</td><td>2</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(a)</td><td>Example:
Speed of access
Just used as a look-up file
No need for any serial or sequential processing
1 mark for any valid point</td><td>1</td></tr>
<tr><td>4(b)(i)</td><td><table><tr><th>CustomerID</th><th>RecordKey</th></tr><tr><td>802139</td><td>2139</td></tr><tr><td>700004</td><td>4</td></tr><tr><td>689998</td><td>89998</td></tr><tr><td>102139</td><td>2139</td></tr></table></td><td>1</td></tr>
<tr><td>4(b)(ii)</td><td>Minimum value: 0 1
Maximum value: 99999 1</td><td>2</td></tr>
<tr><td>4(b)(iii)</td><td><pre>PROCEDURE InsertRecord(CustomerID : INTEGER)
   RecordKey ← CustomerID MOD 100000
   Success ← FALSE
   // Find position for new record and insert it
   REPEAT
      IF record at position RecordKey is <u>empty</u>
         THEN
            Insert new record at position RecordKey
            Success ← TRUE
         ELSE
            IF RecordKey = <u>99999</u>
               THEN
                  RecordKey ← <u>0</u>
               ELSE
                  RecordKey ← <u>RecordKey</u> + 1
            ENDIF
      ENDIF
   UNTIL Success = TRUE
ENDPROCEDURE</pre></td><td>4</td></tr>
<tr><td>4(c)(i)</td><td>For security
If file is hacked then encrypted PIN cannot be used
Only encrypted PINs are transmitted and compared
1 mark for any valid point</td><td>Max 2</td></tr>
<tr><td>4(c)(ii)</td><td>1. Customer ID is read from card
2. Customer enters PIN
3. Customer PIN is <u>encrypted</u>
4. <u>Customer ID is hashed</u>
5. Customer record is located in file
6. <u>PIN is checked against PIN in record</u>
7. If match then transaction can proceed</td><td>3</td></tr>
</table>

Question	Answer	Marks
5(a)(i)	Packet: Both web page and web page request are split into packets 1 Each packet is sent individually from device to device 1	**2**
5(a)(ii)	Router: Transmit packets Contain connections to many other routers When packets arrive at router, router decides where next to send packet 1 mark for any valid point	**Max 2**
5(a)(iii)	TCP/IP: Is the protocol 1 Rules for communication between web server and browser 1	**2**
5(b)(i)	**Two** from: Picture and sound not synchronised 1 Interruptions // video not continuous 1 Can be degraded by other competing traffic 1	**Max 2**
5(b)(ii)	Dedicated communications channel between the two communicating devices 1 Established prior to start of communication // removal of links at end of communication 1	**2**
5(b)(iii)	In packet switching, packets can take different routes and may not arrive in order Will arrive in order (only one route) As packets can take many different routes / share paths with others can be delayed Dedicated circuit has full bandwidth No loss of synch 1 mark for any valid point	**Max 3**

Question	Answer	Marks
6(a)(i)	Control system	**1**
6(a)(ii)	Use of actuators means that the system is controlling	**1**
6(b)	System wastes processor time checking for values that are not changing 1 Some sensor input needs to be acted upon immediately 1	**2**
6(c)(i)	Interrupts need to be disabled so that the process of dealing with an interrupt is itself not interrupted	**1**
6(c)(ii)	After handling the interrupt interrupts need to be enabled so that further interrupts can be dealt with	**1**
6(c)(iii)	Content of registers 1 Placed on stack 1	**2**
6(c)(iv)	Changing sensor value dealt with as soon as it happens 1 Processor needs to check sensor only when an interrupt occurs 1	**2**
6(c)(v)	AND #B0000001000000000 // AND #&0200 // AND #512 Op code 1 Operand 1	**2**