Cambridge International AS & A Level

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Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/33**

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

MARK SCHEME

Maximum Mark: 75

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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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 up-to-date 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 digital certificate
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 Bob’s public key.</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>

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

Question	Answer	Marks
4(a)	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	1
4(b)(i)	<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>	1
4(b)(ii)	Minimum value: 0 1 Maximum value: 99999 1	2

4(b)(iii)	<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 **empty**
	  THEN
	  Insert new record at position RecordKey
	  Success ← TRUE
	  ELSE
	  IF RecordKey = **99999**
	  THEN
	  RecordKey ← **0**
	  ELSE
	  RecordKey ← **RecordKey** + 1
	  ENDIF
	  ENDIF
	  UNTIL Success = TRUE
	ENDPROCEDURE</pre>
		4

4(c)(i)	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	Max 2
4(c)(ii)	1. Customer ID is read from card 2. Customer enters PIN 3. Customer PIN is **encrypted** 4. **Customer ID is hashed** 5. Customer record is located in file 6. **PIN is checked against PIN in record** 7. If match then transaction can proceed	3

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**