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

Question	Answer	Marks																		
2(a)(i)	Worm	1																		
2(a)(ii)	Phishing	1																		
2(a)(iii)	Malicious software that replicates by inserting a copy of itself (1) into a file of data (1)	2																		
2(b)	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	Max 2																		
2(c)(i)	public	1																		
2(c)(ii)	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	2																		
2(c)(iii)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%; text-align: left;">The person performing the action</th> <th style="width: 55%; text-align: center;">What that person does</th> <th style="width: 20%;"></th> </tr> </thead> <tbody> <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 style="text-align: right;">1</td> </tr> <tr> <td>Anna</td> <td>Encrypts email with <u>Bob's public key</u>.</td> <td style="text-align: right;">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 style="text-align: right;">1 1</td> </tr> </tbody> </table>	The person performing the action	What that person does		Anna	Requests Bob's public key.		Bob	Sends Anna his public key.	1	Anna	Encrypts email with <u>Bob's public key</u> .	1	Anna	Sends the email to Bob.		Bob	Decrypts email. Using his private key.	1 1	4
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Question	Answer	Marks																																													
3(a)	$X = A \cdot (\bar{B} + (B \cdot C))$ $B \cdot C$ $\bar{B} + B \cdot C$ $A \cdot$	<p style="text-align: right;">1 1 1</p> <p style="text-align: right;">3</p>																																													
3(b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>Working Space</th> <th>X</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>1 mark first four entries, 1 mark for the last four entries</p>	A	B	C	Working Space	X	0	0	0		0	0	0	1		0	0	1	0		0	0	1	1		0	1	0	0		1	1	0	1		1	1	1	0		0	1	1	1		1	<p style="text-align: right;">2</p>
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3(c)(ii)	<p style="text-align: center;">AB</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td></td> <td>00</td> <td>01</td> <td>11</td> <td>10</td> </tr> <tr> <td rowspan="2" style="vertical-align: middle;">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>			00	01	11	10	C	0	0	0	0	1	1	0	0	1	1	<p style="text-align: right;">2</p>																												
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3(c)(iii)	$X = A \cdot \bar{B} + A \cdot C$ <p style="text-align: center;">1 1</p>	<p style="text-align: right;">2</p>																																													
3(d)	$X = A \cdot (\bar{B} + (B \cdot C))$ $X = A \cdot (\bar{B} + C)$ $X = A \cdot B + A \cdot C$	<p style="text-align: right;">1 1 (dependent mark – must be correct outcome from previous line)</p> <p style="text-align: right;">2</p>																																													

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 border="1"> <thead> <tr> <th>CustomerID</th> <th>RecordKey</th> </tr> </thead> <tbody> <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> </tbody> </table>	CustomerID	RecordKey	802139	2139	700004	4	689998	89998	102139	2139	1
CustomerID	RecordKey											
802139	2139											
700004	4											
689998	89998											
102139	2139											
4(b)(ii)	Minimum value: 0 Maximum value: 99999	1 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 <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>	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)	<ol style="list-style-type: none"> 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 	3										

Question	Answer	Marks
5(a)(i)	Packet: Both web page and web page request are split into packets Each packet is sent individually from device to device	2 1 1
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 Rules for communication between web server and browser	2 1 1
5(b)(i)	Two from: Picture and sound not synchronised Interruptions // video not continuous Can be degraded by other competing traffic	Max 2 1 1 1
5(b)(ii)	<u>Dedicated</u> communications channel between the two communicating devices Established prior to start of communication // removal of links at end of communication	1 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 Some sensor input needs to be acted upon immediately	1 1
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 <u>registers</u> Placed on stack	1 1
6(c)(iv)	Changing sensor value dealt with as soon as it happens Processor needs to check sensor only when an <u>interrupt occurs</u>	1 1
6(c)(v)	AND #B0000001000000000 // AND #0200 // AND #512 Op code Operand	1 1