



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMPUTER SCIENCE

0478/12

Paper 1

May/June 2017

MARK SCHEME

Maximum Mark: 75

Published

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This document consists of **9** printed pages.

Question	Answer	Marks
1	<ul style="list-style-type: none"> • address (bus) • control (bus) • data (bus) 	3

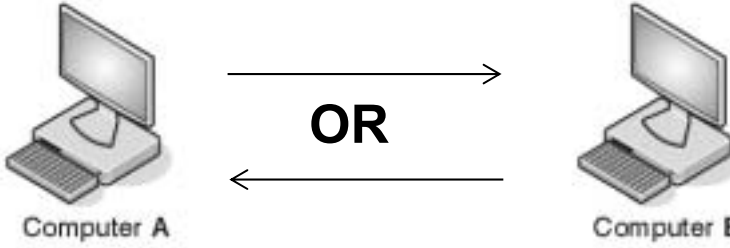
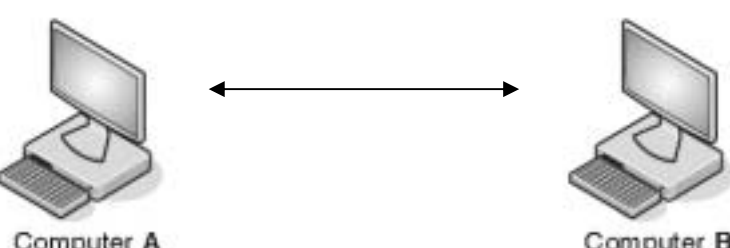
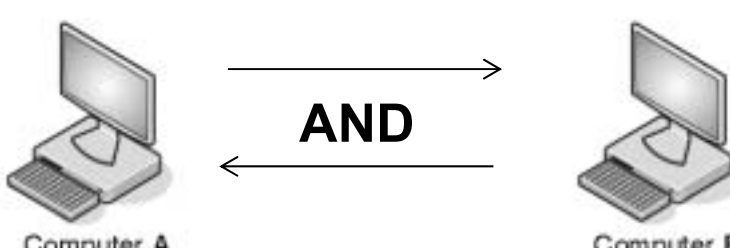
Question	Answer	Marks
2	2 marks for each type of storage Primary storage <ul style="list-style-type: none"> • RAM • ROM Secondary storage <ul style="list-style-type: none"> • hard disk drive (HDD) • solid state drive (SSD) Off-line storage e.g. <ul style="list-style-type: none"> • CD • DVD • Blu-ray • Flash memory // USB storage • <u>removable</u> / <u>external</u> / <u>portable</u> hard disk drive (HDD/SSD) • SD card 	6

Question	Answer	Marks
3	<p>1 mark for each correct line to a max of 4 marks.</p>	4

Question	Answer	Marks
4	<p>Two marks for each correct description</p> <p>Parity Check</p> <ul style="list-style-type: none"> • Checks a byte of data • Check is performed when data is received • A parity bit is added (to the parity byte) • Counts / checks number of 1's // counts / checks to see if 1's are even // counts / checks to see if 1's are odd • Can be <u>even</u> or <u>odd</u> • If parity is incorrect, error is detected <p>Check digit</p> <ul style="list-style-type: none"> • A digit that is calculated from the data // uses modulo to calculate digit // valid description of modulo • It is appended / added to the data • Digit is recalculated when data is entered • Digits are compared to check for error <p>Checksum</p> <ul style="list-style-type: none"> • A value is calculated from the data // Valid description of calculation • It is transmitted with the data • Value is recalculated after transmission • Values are compared after transmission to check for error <p>Automatic Repeat reQuest</p> <ul style="list-style-type: none"> • Uses acknowledgement / request and time-out • Error control protocol • Check performed on receiving data // error is detected by e.g. parity check, check sum • If error detected, request is sent to resend data // negative acknowledgement is used • Resend request is repeated till data is sent correctly / requests time out / limit is reached • Send acknowledgement that data is received // positive acknowledgement is used • If acknowledgement not received in set time data is resent 	8

Question	Answer	Marks																									
5(a)	1 mark for correct method, 1 mark for correct answer $32 + 16 + 8 + 1$ (00)111001	2																									
5(b)	registers must have leading zeros, allow follow through from 5(a) for an incorrect value 1 mark for each correct register. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td> </tr> </table>	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	2
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0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1											
5(c)	Two from: <ul style="list-style-type: none"> • data • ASCII value / Unicode value / character • number • part of image / small image • a sound / sound sample / small sound track • instruction 	2																									
5(d)	3A	1																									

Question	Answer	Marks
6	1 mark for correct name of code, up to a further 3 marks for appropriate explanation <ul style="list-style-type: none"> • Quick response (QR) Code Three from: <ul style="list-style-type: none"> • Barcode is captured / scanned / imaged, by a camera / scanner / barcode reader / QR code reader • Read using a laser • Processed by an app • Light is reflected back • Black squares reflect less light than white squares • Modules are used for orientation / alignment • Squares / data are decoded 	4

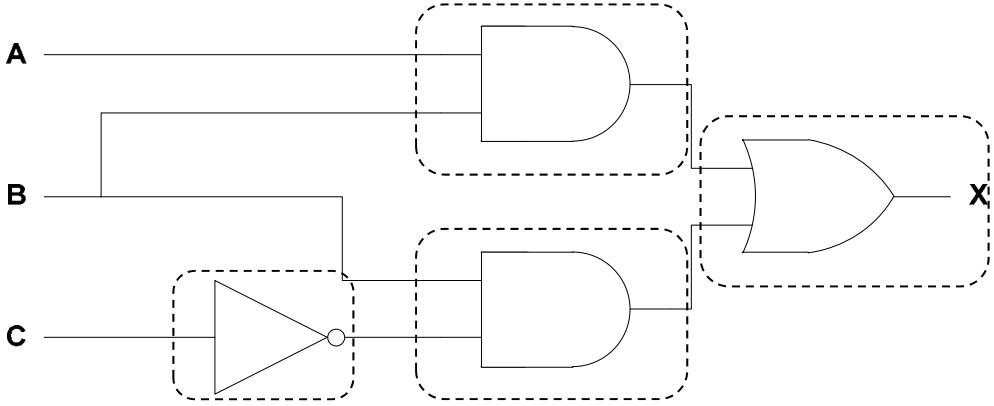
Question	Answer	Marks
7(a)	<p>1 mark for correct arrow(s), one mark for correct description</p> <p style="text-align: center;">Simplex data transmission</p>  <p>(Direction of data is) one way only // unidirectional</p> <p style="text-align: center;">Duplex data transmission</p>  <p>(Direction of data is both ways) <u>at same time</u> / <u>simultaneously</u> / <u>concurrently</u></p> <p style="text-align: center;">Half-duplex data transmission</p>  <p>(Direction of data is both ways) but at different times / <u>not at the same time</u> / <u>not simultaneously</u> / <u>not concurrently</u></p>	6

Question	Answer	Marks
7(b)	<p>1 mark each use, must be different.</p> <p>Simplex e.g.: Microphone to computer Sensor to computer Computer to printer Computer to speaker Computer to monitor Webcam to computer Sending data to a device // sending data from a device</p> <p>Duplex e.g.: Telephone call Voice over IP Computer to printer (only award once) Instant messaging Broadband connections Video conferencing Sending data to and from devices e.g wireless technology Computer to modem</p>	2
7(c)	<p>2 marks for IC, 2 marks for USB</p> <p>IC</p> <ul style="list-style-type: none"> parallel transmission // description of parallel for sending data internally <p>USB</p> <ul style="list-style-type: none"> serial transmission // description of serial for sending data externally (to and from peripherals / between devices) 	4

Question	Answer	Marks
8(a)	<p>2 marks for SSL, 2 marks for Firewall</p> <p>SSL protocol Two from:</p> <ul style="list-style-type: none"> uses encryption encryption is asymmetric / symmetric / both makes use of (public and private) keys data is meaningless (without decryption key / if intercepted) <p>Firewall Two from:</p> <ul style="list-style-type: none"> helps prevent unauthorised access // helps prevent hacking checks that data meets criteria // identifies when data does not meet criteria acts as a filter for (incoming and outgoing) data // blocks any unacceptable data //allows acceptable data through 	4

Question	Answer	Marks
8(b)	<p>Six from:</p> <p>Encrypt the data so it cannot be understood by those not entitled to view it</p> <p>Password protected / biometrics to help prevent unauthorised access</p> <p>Virus checking software helps prevent data corruption or deletion ... identifies / removes a virus in the system ... <u>scans</u> a system for viruses</p> <p>Spyware checking software helps prevent data being stolen/copied/logged ... <u>scans</u> a system for spyware</p> <p>Drop-down input methods / selectable features to reduce risk of spyware / keylogging</p> <p>Physical method e.g. locked doors / CCTV timeout / auto log off ... to help prevent unauthorised access</p> <p>Network / company policies // training employees ... to educate users how to be vigilant</p> <p>Access rights allows users access to data that they have permission to view ... prevents users from accessing data that they do not have permission to view</p>	6

Question	Answer	Marks
9	<p>Six from:</p> <ul style="list-style-type: none"> • temperature sensor • analogue data / temperature is <u>converted to digital</u> data (with an ADC) • sensor sends signal to the microprocessor • microprocessor compares input values with stored values/pre-set values ... • ... if the temperature value input is too high/low ... • ... a signal is sent from the microprocessor to turn on / off / up / down the cooling unit • ... if temperature matches the stored values ... • ... no action is taken • an actuator is used to turn the cooling unit on / off / up / down • the process is a continuous loop 	6

Question	Answer	Marks																																				
10(a)	<p>1 mark for each correct gate, with the correct input(s)</p> 	4																																				
10(b)	<table border="1" data-bbox="300 815 1042 1267"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> </tbody> </table> <p>4 marks for 8 correct outputs 3 marks for 6 or 7 correct outputs 2 marks for 4 or 5 correct outputs 1 mark for 2 or 3 correct outputs</p>	A	B	C	X	0	0	0	0	0	0	1	0	0	1	0	1	0	1	1	0	1	0	0	0	1	0	1	0	1	1	0	1	1	1	1	1	4
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Question	Answer	Marks
11	<p>Seven from:</p> <p>Requested</p> <ul style="list-style-type: none"> • a web browser is used • user enters the URL / web address (into the address bar) // clicks a link containing the web address // clicks an element of the webpage • the URL / web address specifies the protocol • protocols used are Hyper Text Transfer Protocol (HTTP) / Hyper Text Transfer Protocol Secure (HTTPS) <p>Sent</p> <ul style="list-style-type: none"> • the URL / web address contains the domain name • the Internet Service Provider (ISP) looks up the IP address of the company • the domain name is used to look up the IP address of the company • the domain name server (DNS) stores an index of domain names and IP addresses • web browser sends a request to the web server / IP address <p>Received</p> <ul style="list-style-type: none"> • Data for the website is stored on the company's web server • webserver sends the data for the website back to the web browser • web server uses the customer's IP address to return the data • the data is transferred into Hyper Text Mark-up Language (HTML) • HTML is interpreted by the web browser (to display the website) 	7