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Cambridge International General Certificate of Secondary Education

COMPUTER SCIENCE

0478/12

Paper 1

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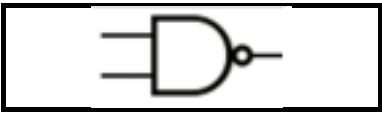
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This document consists of **9** printed pages.

Question	Answer	Marks
1	Any three from: <ul style="list-style-type: none"> • light • temperature • gas • magnetic field • pressure • moisture • humidity • pH • motion 	3

Question	Answer	Marks
2	1 mark for each correctly drawn line to a maximum of 4. <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Logic Gate Symbol</p>  </div> <div style="text-align: center;"> <p>Name</p> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">AND</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">NOT</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">NOR</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">XOR</div> <div style="border: 1px solid black; padding: 5px; width: 150px; text-align: center;">NAND</div> </div> </div> </div>	4

Question	Answer	Marks
3(a)	1 mark for: <ul style="list-style-type: none"> serial Any two from: <ul style="list-style-type: none"> serial data transmission more reliable over distance less likely for the data to be skewed/out of synchronisation less interference as only a single wire it is a cheaper connection as only single wire needed // cheaper to set up 	3
3(b)	<ul style="list-style-type: none"> Register 1 – odd Register 2 – even 	2
3(c)	Any one from: <ul style="list-style-type: none"> checksum ARQ (Automatic Repeat request) 	1

Question	Answer	Marks																										
4(a)	<ul style="list-style-type: none"> a v m v e q n d i z m h (2 marks, 1 for each correct word) 	2																										
4(b)	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>v</td><td>w</td><td>x</td><td>y</td><td>z</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td><td>l</td><td>m</td><td>n</td><td>o</td><td>p</td><td>q</td><td>r</td><td>s</td><td>t</td><td>u</td> </tr> </table> 2 marks <ul style="list-style-type: none"> shift right all characters shifted five places 	v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	2
v	w	x	y	z	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u			
4(c)	<ul style="list-style-type: none"> the first cypher cannot deduce rest of cypher having identified some characters/more random substitution 	2																										

Question	Answer	Marks
5	HTML – HyperText Markup Language / language used to create web pages http – hypertext transfer protocol / protocol used by web browsers https – hypertext transfer protocol secure / secure protocol used by web browsers	3

Question	Answer	Marks												
6	<p>1 mark for each correctly drawn line from a function to its description to a maximum of 4</p> <table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: center; width: 50%;">Function</th> <th style="text-align: center; width: 50%;">Description</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">Interrupt</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">Many processes appear to run simultaneously</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">Utility</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">Data are temporarily held in a buffer waiting for an output device to access it</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">Memory management</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">A signal that causes the operating system to take a specified action</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">Spooling</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">A program that performs a specific task required for the operation of a computer system</td> </tr> <tr> <td style="text-align: center; border: 1px solid black; padding: 5px;">Multitasking</td> <td style="text-align: center; border: 1px solid black; padding: 5px;">A process of assigning blocks of memory to programs running in a computer</td> </tr> </tbody> </table>	Function	Description	Interrupt	Many processes appear to run simultaneously	Utility	Data are temporarily held in a buffer waiting for an output device to access it	Memory management	A signal that causes the operating system to take a specified action	Spooling	A program that performs a specific task required for the operation of a computer system	Multitasking	A process of assigning blocks of memory to programs running in a computer	4
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7	<table border="0" style="width: 100%;"> <tr> <td style="width: 30%; vertical-align: top;">High definition video</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> – lossy (algorithm) – images may contain less detail without noticeable degradation in quality </td> </tr> <tr> <td style="vertical-align: top;">Text</td> <td style="vertical-align: top;"> <ul style="list-style-type: none"> – lossless (algorithm) – so that the original and the decompressed text will be exactly the same </td> </tr> </table>	High definition video	<ul style="list-style-type: none"> – lossy (algorithm) – images may contain less detail without noticeable degradation in quality 	Text	<ul style="list-style-type: none"> – lossless (algorithm) – so that the original and the decompressed text will be exactly the same 	4
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Question	Answer	Marks								
8(a)	Denary – 55 Hexadecimal – 37	2								
8(b)	Binary – (00)111001 Denary – 57 Hexadecimal – 39	3								
8(c)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td style="text-align: center;">0/1</td> <td style="text-align: center;">0/1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0</td> <td style="text-align: center;">0/1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> </tr> </table>	0/1	0/1	0	0	0/1	1	1	1	1
0/1	0/1	0	0	0/1	1	1	1			

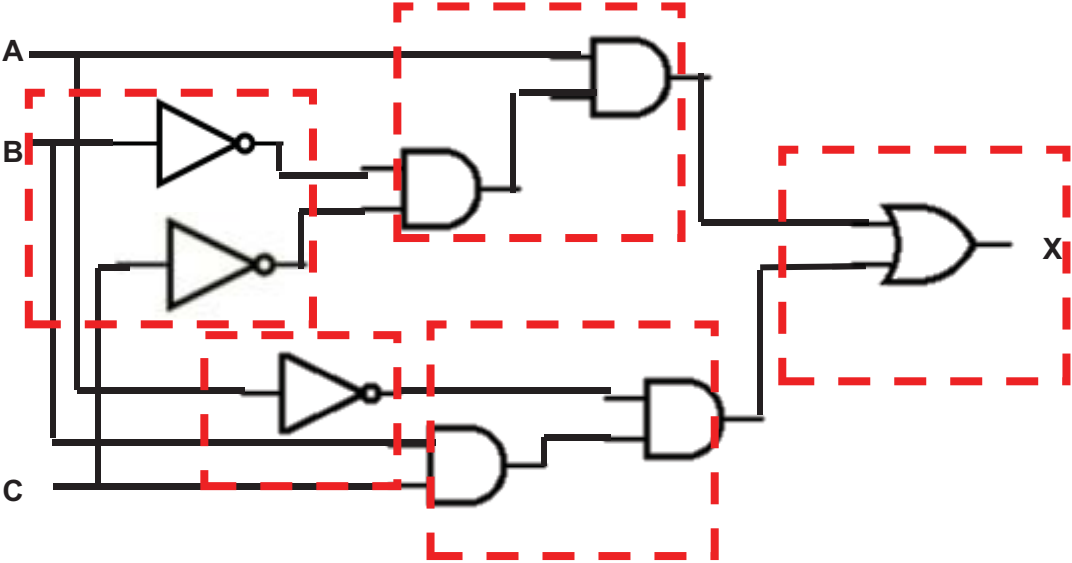
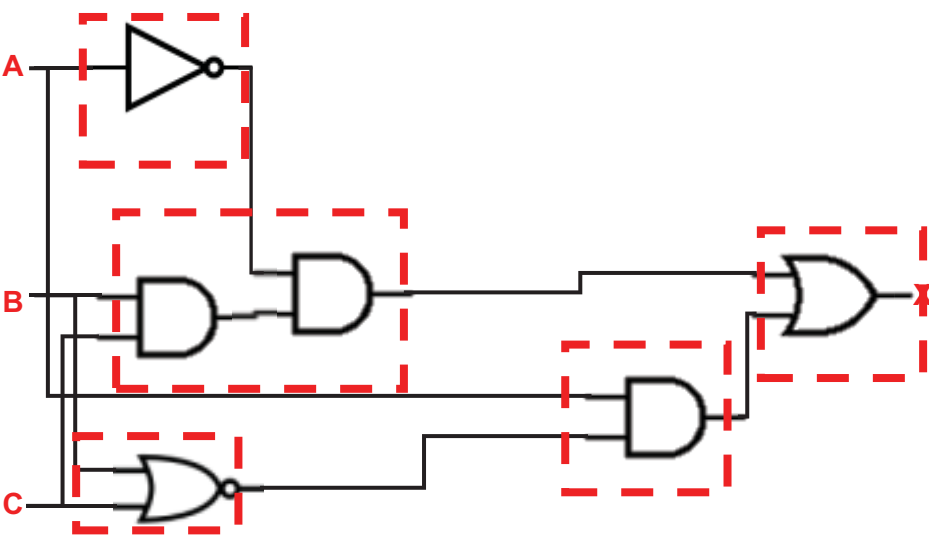
Question	Answer	Marks
9	<p>Any four from, must include at least one difference:</p> <p>Text based password</p> <ul style="list-style-type: none"> • (a minimum number of) characters that can be typed at a keyboard • set / can be changed by the user <p>Biometric password</p> <ul style="list-style-type: none"> • a stored physical measurement e.g. fingerprint • that is compared to a previously scanned human measurement <p>Difference</p> <ul style="list-style-type: none"> • text based passwords are easier to hack than biometric passwords • biometric passwords are unique to that person/cannot be shared 	4

Question	Answer	Marks
10	<p>Any three from:</p> <ul style="list-style-type: none"> • barcode 1D and QR code 2D • barcodes contain vertical lines and QR codes contain 'squares' • QR code can hold more data than a barcode • QR code can be read from any angle, some barcode readers have to be lined up with the barcode // QR codes are more error tolerant / faster to scan than barcodes • barcodes are frequently used at checkouts / libraries // QR codes are used for advertising // QR codes are frequently used by mobile phones to obtain information 	3

Question	Answer	Marks
11	<p>Alice</p> <ul style="list-style-type: none"> • Assembler • translates low level language into machine code / only option for low-level language programs <p>Akbar</p> <ul style="list-style-type: none"> • Interpreter • easy to identify where an error is / to debug a program <p>Alex</p> <ul style="list-style-type: none"> • Compiler • once translated a stand-alone program file is created / no need for the compiler when running the program 	6

Question	Answer	Marks
12(a)	<p>1 mark for appropriate use and 1 mark for suitable example for up to three uses e.g.</p> <ul style="list-style-type: none"> • HTML colours • e.g. blue 0000FF • Display machine code/programs/memory dump • e.g. 5F 3A 09 F1 • Display (MAC) addresses • e.g. 01-23-45-67-89-AB-CD • Display ASCII/Unicode values • e.g. %41 for A • Display error codes • e.g. error #404 page not found 	6
12(b)	<p>Any two from:</p> <ul style="list-style-type: none"> • easier for programmers to read and understand • easier to find errors • conversion to binary easier than denary to binary • more can be displayed on a screen for addresses etc. // smaller display screens can be used • faster than binary for entering numbers 	2

Question	Answer	Marks
13(a)	<p>Primary storage – main memory inside a computer /directly accessed by CPU Example – ROM / RAM</p> <p>Secondary storage – non-volatile/persistent memory that is accessed by a device that is part of a computer system / not directly accessed by the CPU Example – HDD / SSD</p> <p>Off-line storage – non-volatile memory that can be removed from a computer system Example – DVD/ Blu-ray / CD / USB flash memory / removable or external HDD or SSD</p>	6
13(b)	<ul style="list-style-type: none"> • 125 megabytes • CD / <u>low capacity</u> flash memory • good for mailing / inexpensive to buy 	3

Question	Answer	Marks
14(a)	<p>1 mark for each correct indicated area.</p>  <p>This is one example, many others exist.</p> <p>Alternative example</p> 	5

Question	Answer	Marks																																				
14(b)	<p>4 marks for 8 correct bits 3 marks for 6 correct bits 2 marks for 4 correct bits 1 mark for 2 correct bits</p> <table border="1"> <thead> <tr> <th><i>A</i></th> <th><i>B</i></th> <th><i>C</i></th> <th><i>X</i></th> </tr> </thead> <tbody> <tr> <td><i>0</i></td> <td><i>0</i></td> <td><i>0</i></td> <td>0</td> </tr> <tr> <td><i>0</i></td> <td><i>0</i></td> <td><i>1</i></td> <td>0</td> </tr> <tr> <td><i>0</i></td> <td><i>1</i></td> <td><i>0</i></td> <td>0</td> </tr> <tr> <td><i>0</i></td> <td><i>1</i></td> <td><i>1</i></td> <td>1</td> </tr> <tr> <td><i>1</i></td> <td><i>0</i></td> <td><i>0</i></td> <td>1</td> </tr> <tr> <td><i>1</i></td> <td><i>0</i></td> <td><i>1</i></td> <td>0</td> </tr> <tr> <td><i>1</i></td> <td><i>1</i></td> <td><i>0</i></td> <td>0</td> </tr> <tr> <td><i>1</i></td> <td><i>1</i></td> <td><i>1</i></td> <td>0</td> </tr> </tbody> </table>	<i>A</i>	<i>B</i>	<i>C</i>	<i>X</i>	<i>0</i>	<i>0</i>	<i>0</i>	0	<i>0</i>	<i>0</i>	<i>1</i>	0	<i>0</i>	<i>1</i>	<i>0</i>	0	<i>0</i>	<i>1</i>	<i>1</i>	1	<i>1</i>	<i>0</i>	<i>0</i>	1	<i>1</i>	<i>0</i>	<i>1</i>	0	<i>1</i>	<i>1</i>	<i>0</i>	0	<i>1</i>	<i>1</i>	<i>1</i>	0	4
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