



COMPUTER SCIENCE

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Paper 1

March 2017

MARK SCHEME

Maximum Mark: 75

Published

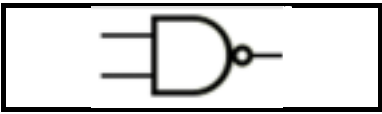
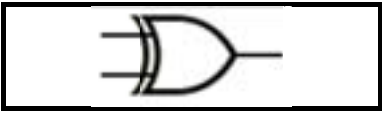
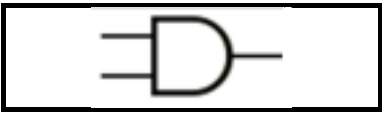
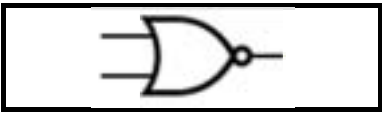
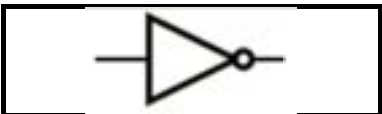
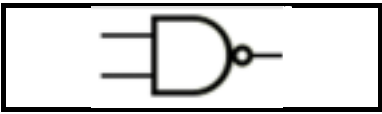
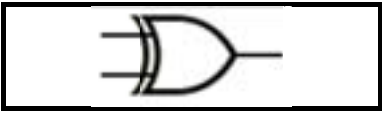
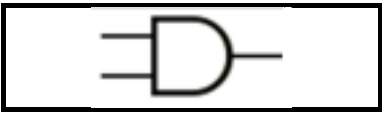
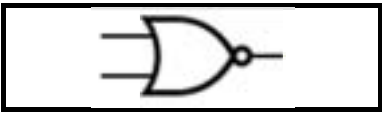
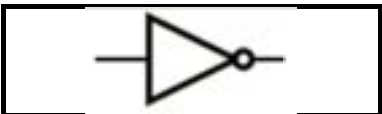
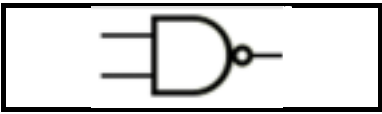
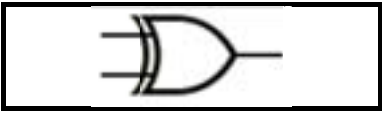
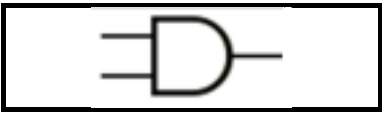
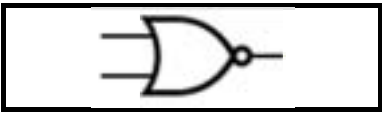
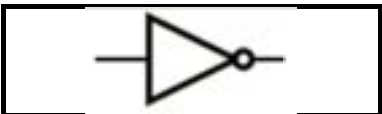
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the March 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

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	<p>1 mark for each correctly drawn line to a maximum of 4.</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; width: 50%;">Logic Gate Symbol</th> <th style="width: 10%;"></th> <th style="text-align: center; width: 40%;">Name</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"> </td> <td style="text-align: center;"><input type="text" value="AND"/></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"> </td> <td style="text-align: center;"><input type="text" value="NOT"/></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"> </td> <td style="text-align: center;"><input type="text" value="NOR"/></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"> </td> <td style="text-align: center;"><input type="text" value="XOR"/></td> </tr> <tr> <td style="text-align: center;"></td> <td style="text-align: center;"> </td> <td style="text-align: center;"><input type="text" value="NAND"/></td> </tr> </tbody> </table>	Logic Gate Symbol		Name			<input type="text" value="AND"/>			<input type="text" value="NOT"/>			<input type="text" value="NOR"/>			<input type="text" value="XOR"/>			<input type="text" value="NAND"/>	4
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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="margin-left: 20px;"> <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;">Function</th> <th style="text-align: center;">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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Question	Answer	Marks
7	<p>High definition video – lossy (algorithm) – images may contain less detail without noticeable degradation in quality</p> <p>Text – lossless (algorithm) – so that the original and the decompressed text will be exactly the same</p>	4

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="margin-left: auto; margin-right: auto;"> <tr> <td>0/1</td> <td>0/1</td> <td>0</td> <td>0</td> <td>0/1</td> <td>1</td> <td>1</td> <td>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			

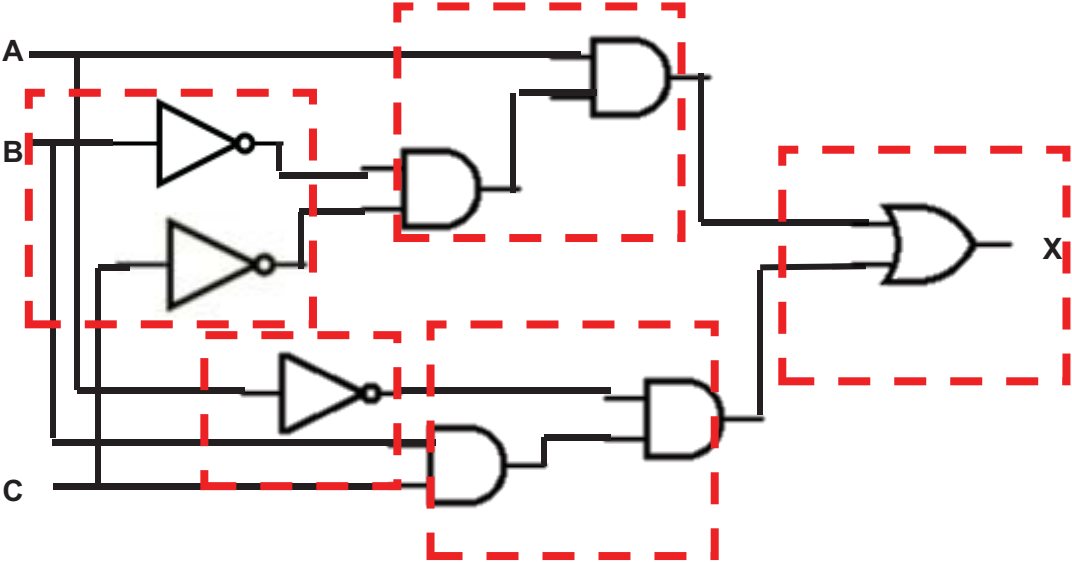
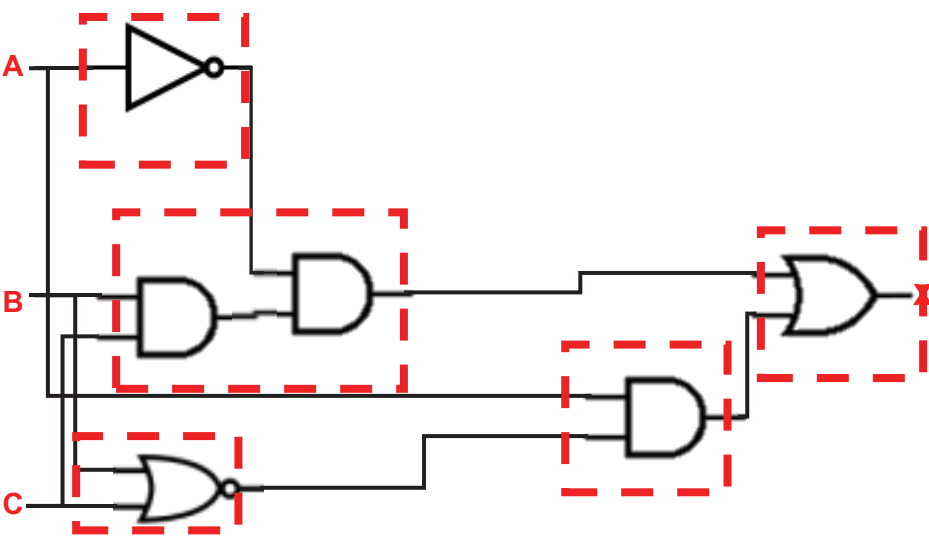
Question	Answer	Marks
9	<p>Any four from, must include at least one difference:</p> <p>Text based password</p> <ul style="list-style-type: none"> • (a minimum number of) characters that can be typed at a keyboard • set / can be changed by the user <p>Biometric password</p> <ul style="list-style-type: 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. 23-45-67-89-AB-CD • Display ASCII/Unicode values • e.g. %41 for A • Display error codes • e.g. error #C04 door open 	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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