**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

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| **COMPUTER SCIENCE** | **0478/01** |
| Paper 1  Theory | **For Examination from 2015** |
| SPECIMEN MARK SCHEME | |
| | **1 hour 45 minutes** |

# MAXIMUM MARK: 75

This document consists of **8** printed pages.

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**2**

1  **(a)**  1 mark for the correct working in BOTH parts
1 mark for valid
1 mark for not valid

Identification number 1: <u>working</u>
= (4 × 6) + (2 × 5) + (1 × 4) + (9 × 3) + (2 × 2) + (3 × 1)
= 24 + 10 + 4 + 27 + 4 + 3
= 72 ÷ 11
= 6 remainder **6**
<u>valid/not valid</u>: NOT valid

Identification number 2: <u>working</u>
= (8 × 6) + (2 × 5) + (0 × 4) + (1 × 3) + (5 × 2) + (6 × 1)
= 48 + 10 + 0 + 3 + 10 + 6
= 77 ÷ 11
= 7 remainder **0**
<u>valid/not valid:</u> VALID                                                          [3]

**(b)**  1 mark for correct working + 1 mark for check digit

<u>working</u>
= (5 × 6) + (0 × 5) + (2 × 4) + (4 × 3) + (1 × 2)
= 30 + 0 + 8 + 12 + 2
= 52
need to add **3** to make the total **55** (i.e. exactly divisible by 11)

<u>check digit:</u> **3**                                                              [2]

**(c)**  1 mark for each description and example

2 digits transposed
(e.g. 280**41**9 becomes 280**14**9/two digits have been switched)
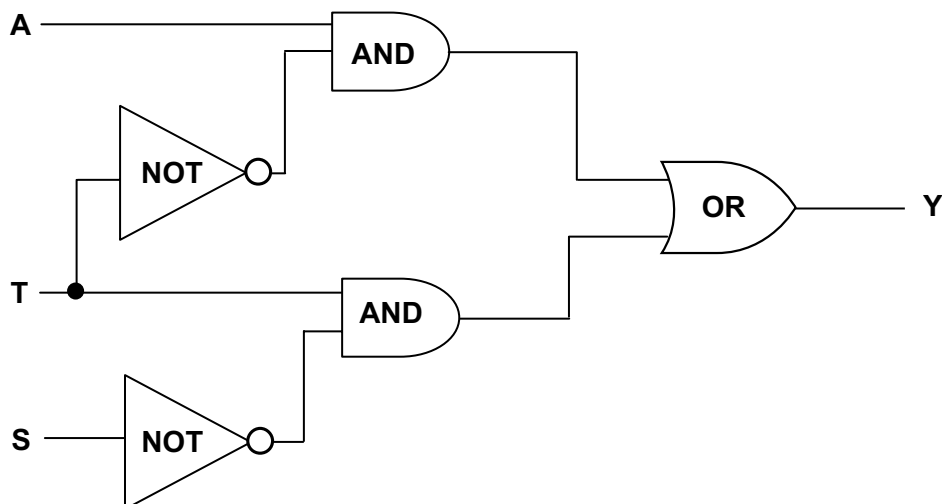incorrect digit
(e.g. 2**8**0419 becomes 2**5**0419/one of the digits has been mistyped)       [2]

2  –  direct access because of concentric tracks
   –  can read and write at the same time because it has a read/write head     [2]

**3 (a)** 1 mark for each logic gate correctly connected



[5]

**(b)**

| A | T | S | Y |
|---|---|---|---|
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 |

1 mark (rows 1-2)
1 mark (rows 3-4)
1 mark (rows 5-6)
1 mark (rows 7-8)

[4]

**4 (a)** 1 mark for hours; 1 mark for minutes

1  6  :  4  9
1 mark   1 mark                                         [2]

**(b)** 1 mark for each digit
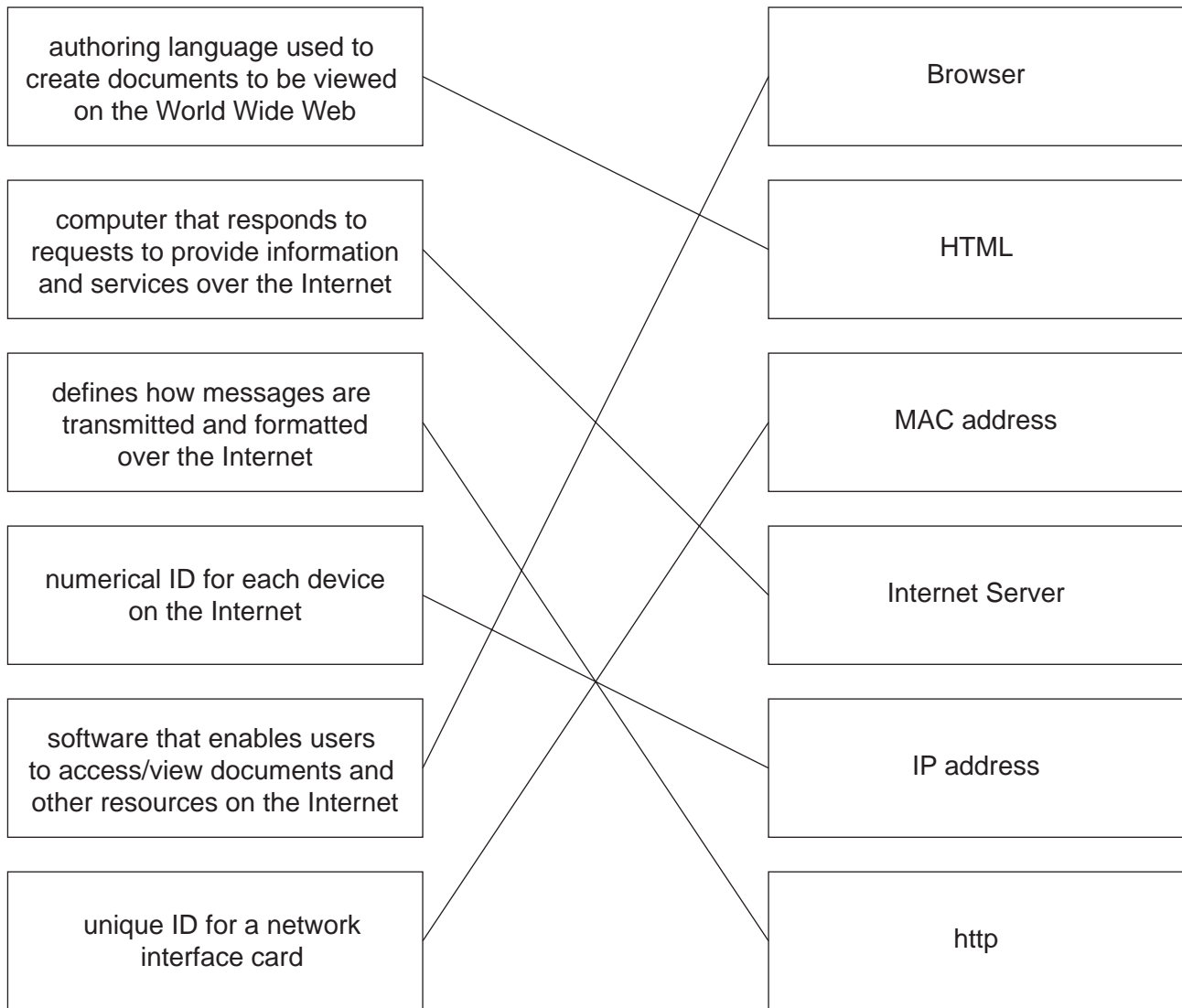
0  0  0  1        1st digit
0  1  1  1        2nd digit
0  0  1  0        3rd digit
1  0  0  1        4th digit                              [4]

**(c)** Any **two** from:
   – microprocessor compares present time with stored time
   – if the values are the same
   – sends signal to sound alarm                                          [2]

**5 (a)** Yes                                                               [1]

**(b)** No                                                                  [1]

**(c)** – re-reading the byte that was sent
   – request that the byte is resent                                        [2]

**6 (a)** Only answers:
   – temperature (sensor)
   – oxygen (sensor)                                                        [2]

**(b)** Any **four** from:
   – information from the sensors sent to microprocessor
   – the ADC converts the analogue data into digital form
   – if temperature < 25ºC   OR   <u>temperature</u> checked against stored value
   – ...microprocessor sends signal to heater/actuator/valve...
   – ...to switch on heater
   – if oxygen level < 20 ppm   OR   <u>oxygen</u> level checked against stored value
   – ...to open valve/oxygen supply
   – use of DAC between microprocessor and devices
   – sounds an alarm if system unable to respond
   – continuously monitors sensor inputs
   – any reference to feedback                                              [4]

**(c)** Any **one** from:
   – unsafe limit stored in memory
   – warning sound/signal if too high a value reached
   – fail safe switch off in case of a malfunction                         [1]

**7 (a)**

| | |
|---|---|
| authoring language used to create documents to be viewed on the World Wide Web | Browser |
| computer that responds to requests to provide information and services over the Internet | HTML |
| defines how messages are transmitted and formatted over the Internet | MAC address |
| numerical ID for each device on the Internet | Internet Server |
| software that enables users to access/view documents and other resources on the Internet | IP address |
| unique ID for a network interface card | http |

   5/6 matches – 5 marks
   4 matches – 4 marks
   3 matches – 3 marks
   2 matches – 2 marks
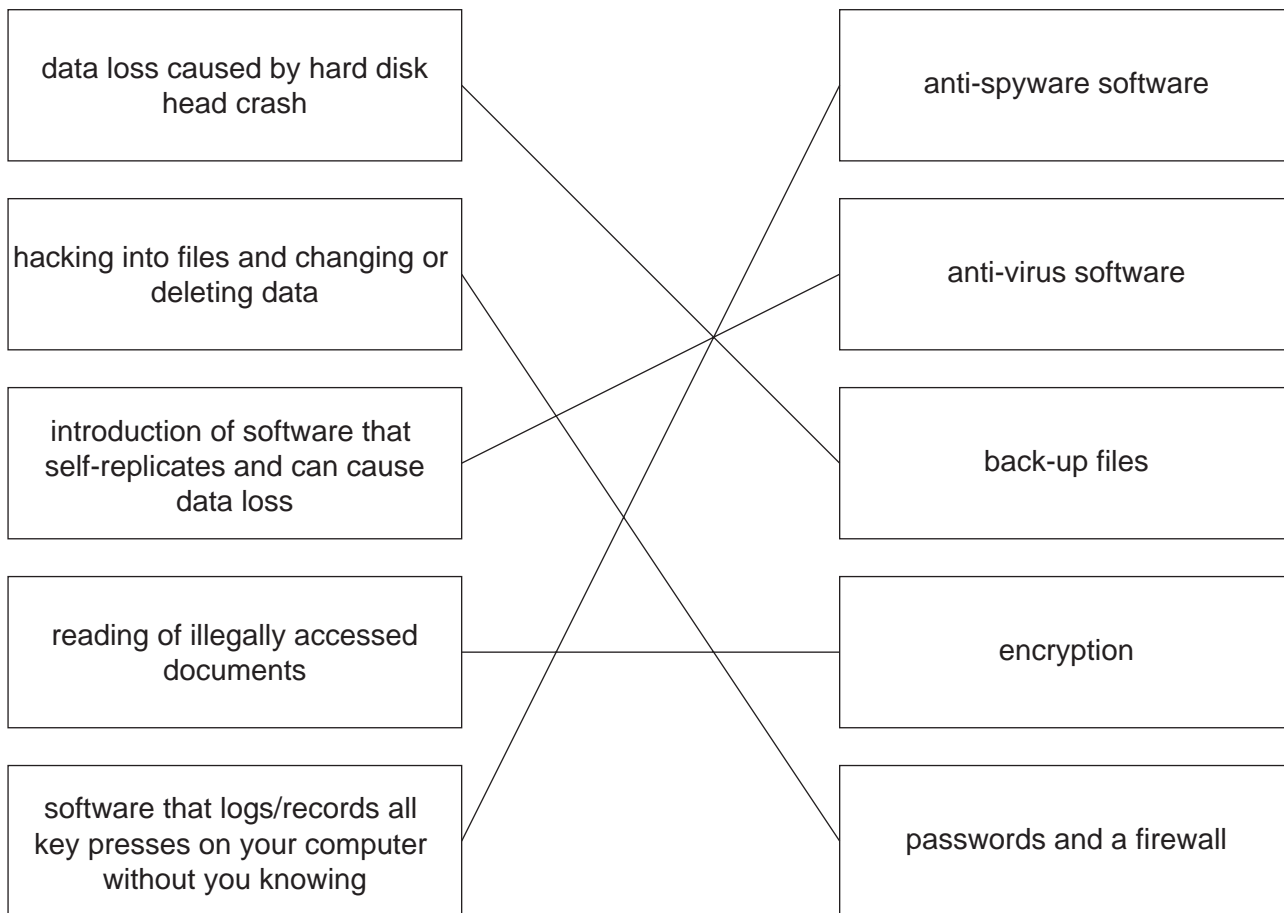   1 match – 1 mark                                                                                        [5]


**(b)** any **two** from:
   – to enable logon information to be kept on his computer
   – to provide pages customised for Ahmed the next time he logs on
   – to implement shopping carts and one-click purchasing
   – to be able to distinguish between new and repeat visitors to the website         [2]

**8** **(a)** **(i)** Any **one** from:
- unit of data/memory
- 8 bits
- used to represent a character [1]

**(ii)** Any **one** from:
- $2^{30}$ bytes
- 1 073 741 824 bytes
- 1 048 576 kilobytes
- 1024 megabytes [1]

**(b)** Any **two** from:

Flash memory
- solid state memory
- no formatting issues
- plugs directly into the USB port
- direct transfer of data

CD-RW
- optical media
- slower access speed/flash memory has faster access speed
- requires a separate drive
- data needs to be burnt/finalised/finished (before being used on another device) [2]

**9** **(a)** Any **one** from:
- buffer
- RAM [1]

**(b)** – interrupt [1]

**10** **(a)** 1 mark for each correct word

**(i)** Hello World [2]

**(ii)** Nmilozgu Pnwgyng [2]

**(b)** – use of Secure Socket Layer
– the key itself is encrypted using strong encryption [2]

PMT

**11**

| | |
|---|---|
| data loss caused by hard disk head crash | anti-spyware software |
| hacking into files and changing or deleting data | anti-virus software |
| introduction of software that self-replicates and can cause data loss | back-up files |
| reading of illegally accessed documents | encryption |
| software that logs/records all key presses on your computer without you knowing | passwords and a firewall |

5/4 matches – 4 marks
3 matches – 3 marks
2 matches – 2 marks
1 match – 1 mark                                                                                      [4]

**12 (a)** code B                                                                                         [1]

**(b)** Any **one** from:
– no need to understand workings of a computer
– easier to understand for programmer/closer to English
– much easier to debug
– much easier to test
– one-to-many when writing commands
– not machine-specific/portable                                                          [1]

**(c)** Any **one** from:
– can address memory addresses directly
– no need for compilers/interpreters
– shorter code/code requires less storage/RAM
– can be written to run faster                                                           [1]

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   **(d)** – compiler produces object code / interpreter doesn't produce object code
   – compiler translates whole program in one go / interpreter translates and executes line at a time
   – compiler produces list of all errors / interpreter produces error message each time an error encountered
   – compiler produces "stand alone code" / interpreter doesn't produce "stand alone code"
   – compilation process is slow but resultant code runs very quickly / interpreted code runs slowly                                                                                   [2]


**13 (a) (i)** 01000001
              01000011                                                                          [2]

       **(ii)** 41
              43                                                                                [2]


   **(b)** FA97                                                                                 [4]


   **(c)** – easier to identify values
          – easier to spot errors                                                              [2]