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 May/June 2015 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
1 (a) parallel
   any one from:
   – 8 bits/1 byte/multiple bits sent at a time
   – using many/multiple/8 wires/lines (1 mark)
   serial
   any one from:
   – one bit sent at a time
   – over a single wire (1 mark) [2]

(b) parallel
   – faster rate of data transmission (1 mark)

   serial
   any one from:
   – more accurate/fewer errors over a longer distance
   – less expensive wiring
   – less chance of data being skewed/out of synchronisation/order (1 mark) [2]

(c) parallel
   any one from:
   – sending data from a computer to a printer
   – internal data transfer (buses) (1 mark)
   serial
   – connect computer to a modem (1 mark) [2]
2 (a) – universal serial bus
– description of USB

(b) Any two from:
– devices are automatically detected and configured when initially attached
– impossible to connect device incorrectly/connector only fits one way
– has become the industry standard
– supports multiple data transmission speeds
– lots of support base for USB software developers
– supported by many operating systems
– backward compatible
– faster transmission compared to wireless

3 (a)
(b) 1 mark per dotted section

(c) X is 1 if:

\[(A \text{ is } 1 \text{ OR } B \text{ is } 1) \text{ AND } (B \text{ is } 1 \text{ OR } C \text{ is } \text{ NOT } 1)\]

(1 mark)

accept equivalent ways of writing this:

e.g. \((A \text{ OR } B = 1) \text{ AND } (B \text{ OR NOT } C = 1)\)
e.g. \((A \text{ OR } B) \text{ AND } (B \text{ OR NOT } C)\)
e.g. \((A + B) (B + \overline{C})\)
4 1 mark per correct word

1 protocol

2 web server name accept these three items in any order

3 file name

HTML tags/text

firewall

proxy server

5 1 mark per device, 1 mark per category

<table>
<thead>
<tr>
<th>Description of storage device</th>
<th>Name of storage device</th>
<th>Category of storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>optical media which uses one spiral track; red lasers are used to read and write data on the media surface; makes use of dual-layering technology to increase the storage capacity</td>
<td>DVD</td>
<td></td>
</tr>
<tr>
<td>non-volatile memory chip; contents of the chip cannot be altered; it is often used to store the start-up routines in a computer (e.g. the BIOS)</td>
<td>ROM</td>
<td>✓</td>
</tr>
<tr>
<td>optical media which uses concentric tracks to store the data; this allows read and write operations to be carried out at the same time</td>
<td>DVD-RAM</td>
<td>✓</td>
</tr>
<tr>
<td>non-volatile memory device that uses NAND flash memories (which consist of millions of transistors wired in series on single circuit boards)</td>
<td>Solid State Drive/memory (SSD)</td>
<td>✓</td>
</tr>
<tr>
<td>(SD/XD card) (USB storage device)</td>
<td></td>
<td>(✓)</td>
</tr>
<tr>
<td>optical media that uses blue laser technology to read and write data on the media surface; it uses a single 1.1 mm polycarbonate disc</td>
<td>Blue-ray</td>
<td>✓</td>
</tr>
</tbody>
</table>
6 (a) virus

any two from:

– program/software that replicates/copies itself
– can delete or alter files/data stored on a computer
– can make the computer “crash”/run slow

pharming

any two from:

– malicious code/software installed on a user’s hard drive/actual web server
– this code redirects user to a fake website (without their knowledge)
– to obtain personal/financial information/data

phishing

any two from:

– legitimate-looking emails sent to a user
– as soon as recipient opens/clicks on link in the email/attachment …
– … the user is directed to a fake website (without their knowledge)
– To obtain personal/financial information/data

(b) (i) Any two from:

– spyware/key logging software can only pick up key presses
– using mouse/touchscreen means no key presses to log
– the numbers on the key pad are in random/non-standard format, which makes it more difficult to interpret
(ii) 1 mark for name and 1 mark for description

any one from:

- chip and PIN reader
  - only the user and the bank know which codes can be generated

- request user name
  - additional security together with password/PIN

- anti-virus
  - removes/warns of a potential virus threat which can’t be passed on to customers

- firewall
  - (helps) to protect bank computers from virus threats and hacking

- encryption
  - protects customer data by making any hacked information unreadable

- security protocol
  - governs the secure transmission of data

- Biometric
  - to recognise user through the use of, e.g. facial/retina/finger print

- Alerts
  - users IP/MAC address is registered and user is alerted through, e.g. SMS if account is accessed through an unregistered address

[2]

7 (a)

- address bus
  - this bus carries signals used to coordinate the computer’s activities

- control bus
  - this bi-directional bus is used to exchange data between processor, memory and input/output devices

- data bus
  - this uni-directional bus carries signals relating to memory addresses between processor and memory

2/3 matches – 2 marks
1 match – 1 mark

[2]
(b)  

<table>
<thead>
<tr>
<th>Description of Stage</th>
<th>Sequence Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instruction is then copied from the memory location contained in the MAR (memory address register) and is</td>
<td>3</td>
</tr>
<tr>
<td>placed in the MDR (memory data register)</td>
<td></td>
</tr>
<tr>
<td>The instruction is finally decoded and is then executed</td>
<td>7</td>
</tr>
<tr>
<td><em>The PC (program counter) contains the address of the next instruction to be fetched</em></td>
<td>(1)</td>
</tr>
<tr>
<td>The entire instruction is then copied from the MDR (memory data register) and placed in the CIR (current</td>
<td>4</td>
</tr>
<tr>
<td>instruction register)</td>
<td></td>
</tr>
<tr>
<td>The address contained in the PC (program counter) is copied to the MAR (memory address register) via the</td>
<td>2</td>
</tr>
<tr>
<td>address bus</td>
<td></td>
</tr>
<tr>
<td>The address part of the instruction is placed in the MAR (memory address register)</td>
<td>6</td>
</tr>
<tr>
<td>The value in the PC (program counter) is then incremented so that it points to the next instruction to be</td>
<td>5*</td>
</tr>
<tr>
<td>fetched.</td>
<td></td>
</tr>
</tbody>
</table>

The incrementation of the program counter can appear at any stage after 2. All other stages must be in the correct given order. [6]

8 (a) hours: 18

minutes: 53 [2]

(b)  

<table>
<thead>
<tr>
<th>Hours (“C”)</th>
<th>Minutes (“D”)</th>
</tr>
</thead>
</table>
| 0 0 0 0 1 1 1 | 0 0 0 1 1 1 1 0 | [2]
(c) Any three from:

– reads values in registers “C” and “D”
– and checks the values against those stored in registers “A” and “B”
  (NOTE: the first two statements can be interchanged, i.e. “A” and “B” read first)
– If values in corresponding registers are the same
– the microprocessor sends a signal to sound alarm/ring [3]

(d) Any three from:

– uses a light sensor
– sends signal/data back to microprocessor
– signal/data converted to digital (using ADC)
– value compared by microprocessor with pre-set/stored value
– if value < stored value, signal sent by microprocessor …
– … to the voltage supply (unit)
– … “value” of signal determines voltage supplied/brightness of LED [3]

(e) Any two from:

– no need to warm up
– whiter tint/more vivid colours/brighter image
– higher resolution
– much thinner monitors possible/lighter weight
– more reliable technology/longer lasting
– uses much less power/more efficient [2]
What is the denary (base 10) equivalent to the hexadecimal digit “E”?

If 1 GByte = 2^X then what is the value of X?

The number of bits in one byte

If the broadband data download rate is 40 megabits/second; how long will it take to download a 60 MByte file?

What is the denary (base 10) value of the binary number: 0 0 1 0 0 1 0 0?

What hexadecimal value is obtained when the two hexadecimal digits, C and D, are added together?

5/6 matches – 5 marks
4 matches – 4 marks
3 matches – 3 marks
2 matches – 2 marks
1 match – 1 mark
10  1 mark per correctly placed tick

<table>
<thead>
<tr>
<th>statement</th>
<th>interpreter</th>
<th>compiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>takes one statement at a time and executes it</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>generates an error report at the end of translation of the whole program</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>stops the translation process as soon as the first error is encountered</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>slow speed of execution of program loops</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>translates the entire program in one go</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>