CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2014 series

9691 COMPUTING

9691/11   Paper 1 (Written), maximum raw mark 75

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 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1 (a)

	A	B	C	D
	primary memory storage	**magnetic secondary storage**	**optical secondary storage**	**solid state secondary storage**
DVD – RAM			✓	
ROM	✓			
hard disk		✓		
flash memory				✓

1 mark for each correct tick [4]

(b) (i) A [1]

(ii) B [1]

(iii) C / D (If both ringed here then still award a mark) [1]

(c) 1 mark for a benefit and 1 mark for a drawback
<u>benefit</u>
– faster start up speed (no "spin-up" required)
– no moving parts (so more robust)
– very fast read write seek (latency) times
– doesn't require additional read/write hardware devices (just plugs into USB)
– can store data indefinitely <u>provided</u> that it is periodically refreshed

<u>drawback</u>
– vulnerable to magnetic fields and electrostatic charges
– limited write cycles
– more vulnerable to corruption if used as primary source of saving files
– because it is small, very easy to lose [2]

2 (i)   Any **two** from:

  circuit switching
  –   path decided on before data transmission starts
  –   system decides in which route to follow …
  –   … and transmission goes according to this path/route
  –   for whole length of communication session, route is dedicated exclusively
  –   route only released when data transmission stops

  packet switching
  –   data is broken up into packets
  –   packets are reassembled at destination
  –   packets are sent towards destination independent of each other
  –   each packet has to find its own route to destination
  –   decision as to which path to take is decided when each node is reached
  –   nodes are switches, routers, etc.
  –   each packet finds its way based on information it carries   [2]

 (ii)   Any **two** from:
  baseband
  –   data sent as digital signals …
  –   … through the media as a single channel
  –   … that uses entire bandwidth of the media
  –   it is bi-directional
 –   (frequency-division) multiplexing is not possible

  broadband
  –   data sent in form of analogue signals
  –   each transmission is assigned to a portion of the bandwidth …
  –   … thus multiple transmissions are possible at the same time
  –   communication is uni-directional
  –   to send and receive needs two pathways …
  –   … either by assigning a frequency for sending and a different frequency for receiving
  –   … or by using different communication paths
  –   multiplexing is possible using this method   [2]

(iii)   Any **two** from:

  ring topology
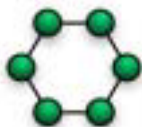
                    or if diagram described
  –   faulty connections can cause whole network to fail
  –   it is difficult to expand this type of network
  –   works well under heavy loading
  –   possible to form very large networks
  –   no server
  –   less secure (because data passes through all computers)

star topology

or if diagram described
- failure in any connection doesn't necessarily stop the rest of the network from working
- if the central hub/switch fails then the whole network fails
- it is easier to identify faults in this arrangement
- it is easier to expand this type of network
- needs server
- more secure (nodes contact each other directly through the hub)   [2]

3   (a)   1 mark for feature + 1 mark for reason (reason must match feature)

- very clear, non-confusing icons/representations of flight paths
    - therefore it is easy to identify flights/less errors in identification

- use of very clear and consistent colours (e.g. green – ok, red – danger, etc.)
    - allows "at a glance" status of each flight

- easy to navigate between screens
    - to allow fast transfer to and from other flight information screens

- audible warnings of dangerous situations
    - in case any messages on the screen have been "overlooked"

- not too much information on the one screen
    - to avoid "information overload"/so that important details aren't "hidden"   [4]

   (b)   1 mark for method + reason which must be in context of air traffic control

appropriate

- pilot or direct
- not possible to run two systems together for safety reasons
- direct is an immediate changeover, so only one system in place
- pilot system only works if there is more than one control room

not appropriate

- parallel or phased
- parallel requires two systems running concurrently .. not possible here
- whole system needs to be up and running so phased wouldn't work for safety reasons

                                                                                      [2]

(c) 1 mark for type + 1 mark for situation/description

- adaptive …
- … alter the solution to take into account changes in external influences (e.g. new airport legislation, new international safety rules, etc.)
- perfective …
- … alter the solution to improve the overall performance   [4]

4 (a)

data item	pass	fail
K X 2 3 7 N		✓
N A 8 3 K K	✓	
W 4 4 6 P Q	✓	
C 2 4 3 3 Q		✓
R 4 9 N L	✓	

[5]

(b) (i)

T	9	9	0	T	T	T

$\longleftarrow$ 1 mark $\longrightarrow$$\longleftarrow$ 1 mark $\longrightarrow$$\longleftarrow$ 1 mark $\longrightarrow$

Alternative   T   0   9   9   T   T   T

Or   T   9   0   9   T   T   T   [3]

(ii) 1 mark for correct example (allow follow through)

Examples of items that should pass:

N812 CHG
B3 HMX
G45 AGR [1]

(iii) 1 mark for correct example (allow follow through)

Examples of items that should fail:

N1234 KK
B202 BT
123 FKN [1]

5   1 mark for each explanation

monitoring a chemical plant needs to be done in real time since an immediate response to conditions is required (for safety reasons); batch processing would not allow this to be done in real time (OR CONVERSE ANSWER)

a programmer is still required; the costs are reduced since the development work is shared between the purchasers of the software package

it is not possible to write to ROM; so ROM cannot save data/files that are in current use; this requires RAM

sensors cannot control motors (etc.) directly; the data needs to be first read by a <u>computer/(micro)processor</u> which then decides what action to take based on stored data   [4]

6   **(a)** –   a two dimensional array
   –   of integer / character accept algorithm/pseudocode to initialise array / 9 × 9 grid   [2]

   (b) 1 mark per point

   (i) –   using a mouse or touch screen or arrow keys …
      –   … select square where number is to be placed
      –   numbers <u>1–9</u> appear in a drop down menu/list
      –   required number is selected
      OR
      –   select square where number is to be placed
      –   using mouse, touch screen or arrow keys
      –   type in the required number using a keyboard   [2]

   (ii) Any **two** points from:

      –   two FOR .. TO loops used to control inner and outer loops
      –   computer compares each value in same position in both arrays
      –   this is done for every position (81 numbers)
      –   if all the numbers in both arrays are identical then puzzle is solved correctly
      –   if any numbers in the two arrays are different then computer flags an error
      OR
      –   loop to compare all cells in a row to check for duplication of numbers or blank
      –   loop to compare all cells in column to check for duplication of numbers or blank
      –   loop to compare all cells in 3 × 3 grid to check for duplication of numbers or blank [2]

7   1 mark for each feature of the 3 types of application software + 1 mark for input device and its justification + 1 mark for output device and its justification

<u>computer aided design (CAD)</u>

<u>features</u>
–   2D and 3D modelling
–   use of wire frames
–   library of parts
–   ability to calculate cost of final item
–   ability to calculate weight of the final object
–   features such as rotation, zoom, colour, etc.
–   kinematics (testing any moving parts in final design to see they interfere with each other)
–   links into CAM

<u>input device + correct justification</u>
–   light pen /
    graphics tablet   –   to draw/move/select objects on the screen (if CRT used)

–   trackerball   –   to move/select items on the screen
–   <u>space</u> mouse   –   allow users to manipulate three-dimensional objects on a screen

–   <u>space</u> ball   –   as above

<u>output device + correct justification</u>

–   **large** monitor/screen   –   screen needs to be large to accommodate some very complex and intricate designs

–   (graph) plotter   –   to print out large of even full size drawings
–   3D printer   –   to "print out" working prototypes (less expensive than building prototype)   [3]

<u>spreadsheet</u>

<u>features</u>

–   ability to do calculations
–   ability to produce graphs and charts from data
–   ability to use formulas
–   use of macros to do automatic calculations (e.g. calculate tax) / ability to program own functions

<u>input device + justification</u>

–   keyboard   –   to enter data into the spreadsheet directly
–   mouse   –   to select graph types/spreadsheet features from menus

<u>output device + justification</u>

–   <u>dot matrix</u> printer   –   to print out the wage slips
–   monitor   –   to see graphs and charts of company sales and profits
–   <u>laser/inkjet</u> printer   –   to produce reports for the management team and total wages bill for the month/year   [3]

presentation

features

– slide transitions
– integrate multimedia (sound, movies, animation) into the presentation
– embed links to websites to enhance the presentation
– introduce attractive colours, fonts, etc. to make presentation more interesting

input device + justification

– pointing device/mouse   – to select items for inclusion in presentation
– microphone   – to record voice overs
– keyboard   – to input text for use in slides
– remote control   – to control slide show transitions
– <u>digital</u> camera   – to input still / moving images

output device + justification
– multimedia projector   – to allow all the features of presentation to be shown and heard
– loud speakers   – to hear voice overs and any background music (etc.)
– large screen   – so large audiences can see presentation from anywhere in the room
– printer   – to allow notes to be produced to accompany the presentation
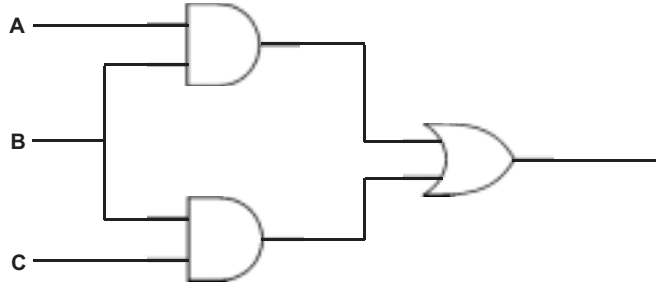
[3]

8   (a)   2 marks per part
IF candidate uses 2 gates mark from 2 gate diagram if draws 3 gates mark from 3 gate diagram for all 3 parts
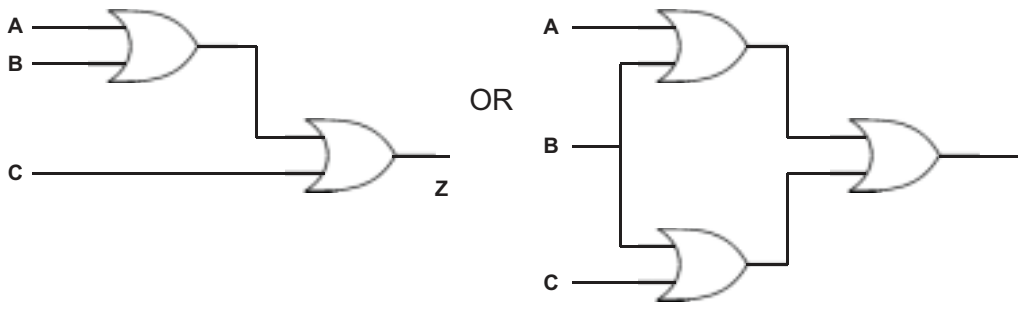
   (i)   (allow correct alternatives)

OR
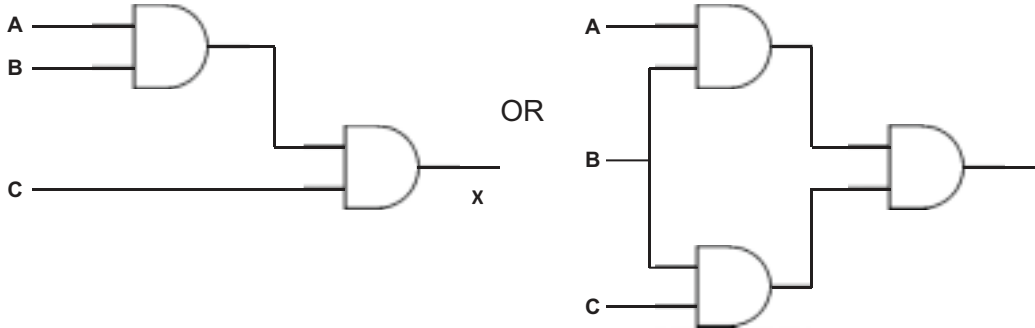
[2]

(ii)

[2]

(iii)   (allow correct alternatives)

OR

[2]

(b)

A	B	C	X	Y	Z
0	0	0	**0**	**0**	**0**
0	0	1	**0**	**0**	**1**
0	1	0	**0**	**0**	**1**
0	1	1	**0**	**1**	**1**
1	0	0	**0**	**0**	**1**
1	0	1	**0**	**0**	**1**
1	1	0	**0**	**1**	**1**
1	1	1	**1**	**1**	**1**

                    2 marks   2 marks   2 marks

(−1 mark for each error in each column)   [6]

9 **(a)**

0	1	1	0	1	0	0

[1]

(b) – chocolate with extra milk + sugar [1]

(c) – this will cause an error message
– number is > max value of 63 [1]

(d) part (b):

0

part (c):

1

[2]

(e) **(i)** Any **one** point from:

– each bit in a byte is transmitted along individual channels/wires
– each of the 8 bits/1 byte transmitted along several/8 wires/channels [1]

(ii) Any **three** points from:
CHECK for annotations on the table of zeros and ones
MARK grid first
– byte 7:   0 0 1 1 1 0 1 1   has odd parity (*shown by an arrow*)
– column 5 (counting from the left) indicates that parity byte is incorrect in position 5

– therefore bit in row 7, column 5 is in error
– the bit in that position should change from 1 to 0 to make even parity in all bytes
– this gives the corrected byte as: 0 0 1 1 **0** 0 1 1 [3]