CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Subsidiary Level and GCE Advanced Level

MARK SCHEME for the May/June 2013 series

9691 COMPUTING

9691/13 Paper 1 (Written Paper), 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 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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(1) (a) Any **one** from:

collection of systems programs
that control the activities of the computer system
acts as an interface between user and hardware
manages the applications and hardware etc. [1]

(b) 1 mark for naming type of real time process + up to 2 marks for description of each type

real time transaction (processing)/booking system
requires file/database to be updated immediately/prevent double booking
examples include airline bookings, theatre bookings

real time process control/manufacturing
makes use of sensors and feedback loops
the output from the system affects the next input
examples include monitor/control of a chemical plant [4]

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

for example, a washing machine or microwave oven
ROM stores the whole instruction set
microprocessor has just one set of tasks to perform
system expects simple inputs (e.g. keypad on front of washing machine)
the microprocessor has simple, never-changing hardware functions to control [2]

2 (a) Any **four** points from:

data is transferred from primary memory to hard disk buffer
when the buffer is full, the processor can carry on with other tasks
hard disk buffer is emptied
when hard disk buffer is empty, hard disk sends an interrupt to the processor requesting more data to be sent
according to priorities [4]

(b) control unit – any **two** points from:

manages execution of instructions
fetches each instruction in turn
decodes and synchronises its execution
by sending control signals to other parts of the processor

memory unit – any **two** points from:

stores program currently in use
stores data currently in use
stores parts of the operating system currently in use [4]

3 (a) Any **four** points from:

sensors send signal/data to the computer
data is converted into digital form/converted by ADC
sensor data is then interpreted as seismic data by computer s/ware
if data values > normal activity (stored in computer files) ….
... then computer sends a signal
(which needs to be converted into analogue signal)
... to actuators which sound an alarm
... or to a computer screen and the data is shown as red/flashing/ animation [4]

(b) (i) Any **three** from:

graphics on screen interpret the data in easy to understand form
data superimposed on map of area being monitored
animated circles show seismic intensity on map
data is shown in red if it is unusually high
the interface should be easy to use/interpret [3]

(ii) touch screens
trackerball
keyboards
can easily select graphic on screen by touching screen/moving arrow
easy to navigate around the screen to look at data in different areas
need to type in data, queries/commands etc. … so keyboard is required [3]

4 1 mark for each device + 1 mark for description of use

large monitor/screen
designs can be very complex and it is necessary to have very large screen so the detail can be seen easily

light pens
if the design team are using CRT monitors, then light pens can be used to draw things, move things on screen, pick up items, etc.

plotters
to produce very large hard copy outputs; sometimes full size drawings of designs are needed or there is the need to produce a blue print for the manufacturing department

space mouse/space ball
these are used when doing 3D work in CAD; they allow the manipulation of 3D objects on screen in all 6 directions

3D printers
these printers produce solid, working prototypes directly from the drawings

Graphics tablet
ease of producing the design [6]

5 (a) Any **three** points from:

sample declaration: **`MyTable [1:3, 1:6]`**
use of 2-dimensional array
(of type) integer
use of two nested loops to feed in x-data and y-data
data is read in rows or columns corresponding to matrix data given
sample algorithm:

```
for x = 1 to 3
   for y = 1 to 6
      read MyTable [x, y]
   next y
next x
```

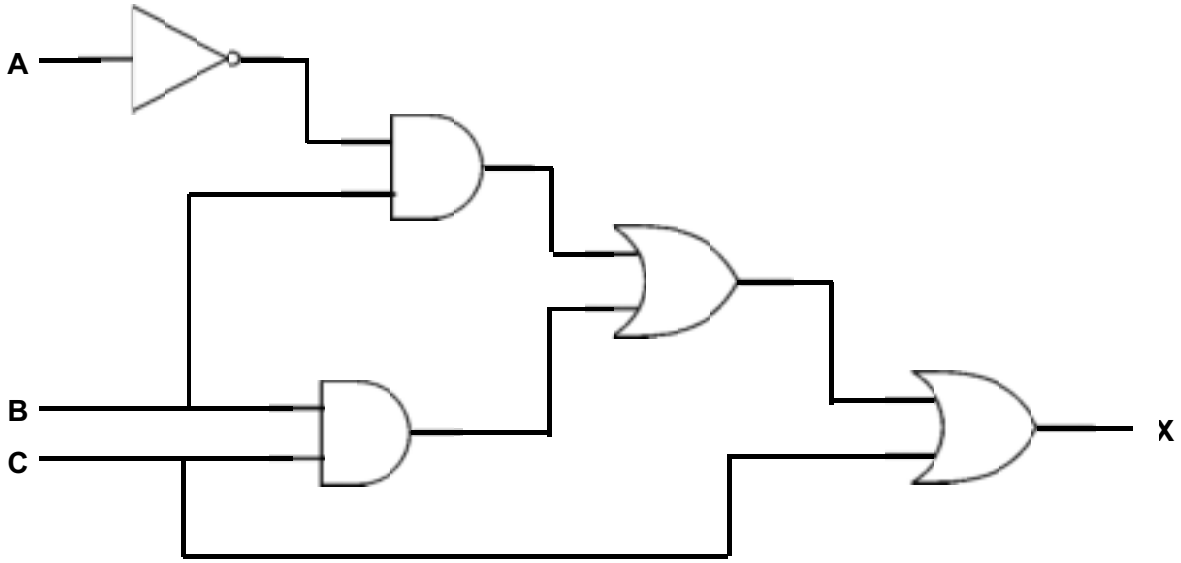
[3]

(b) value 6 referenced at **`MyTable [2, 3]`** [1]

(c) Any **three** points from:

scan all the data in the array (row by row or column by column)
use of for … to loops to search array
check the value in each position in the array
if value < = 0 then output a message and indicate position in array where erroneous data is stored
use of example on exam paper: errors at: [2, 4], [2, 5], [2, 6], [3, 1] and [3, 2] would all be flagged/error message given
sample algorithm showing search error indication [3]

6 (a) 1 mark per correct logic gate (accept other logic gate nomenclature)



[5]

(b)

A	B	C	X	
0	*0*	*0*	0	}
0	*0*	*1*	1	
0	*1*	*0*	1	}
0	*1*	*1*	1	
1	*0*	*0*	0	}
1	*0*	*1*	1	
1	*1*	*0*	0	}
1	*1*	*1*	1	

[4]

7 (a) 1 mark for each design feature + 1 mark for factors that need to be considered

specify hardware and software
if there are large volumes of data this will dictate the type of printer they buy or the type of file access will dictate that they buy a hard disk drive; if they need to do finances then they may need to buy a spreadsheet

design data collection forms/screen layouts/report layouts
if customers can buy items in the shop then it will be necessary to design good screen layouts which are easy to use; data collection forms may be necessary if there is much paperwork that needs transferring to the new system, for example

design data validation routines
the type of data that is input will dictate what kind of validation is needed e.g. catalogue numbers when customers order in shop may need format check; file structures may require validation routines (customer records)

design the user interface
it may be necessary to consider touch screens, use of drop down menus depending on what is decided about screen layouts [8]

(b) Any **three** points from:

table showing type of testing, test data, expected results, actual results and comments about results/testing
(NOTE: give 1 mark if 2 headings from table given and 2 marks if all 3+ mentioned)
test results help systems analyst make judgements
comparison made between *actual results* and *expected results*
if results are not as expected, the system is modified
comments on comparisons table help in the overall evaluation [3]

8 (a) (i) character "A" [1]

(ii) column number: 6
row number: 8 [1]

(iii) Any **three** points from:

character "A" is showing *even parity*
column 6 is also showing *even parity*
where the column and row intersect is position (6, 8)
the bit value here should be 0 and not 1 [3]

(b) Any **three** points from:

bytes sent as a block
bytes added up before transmission
result of addition is sent with the data block
same calculation is carried out at receivers end
the two values are compared [3]

9 (a) Any **five** points from:

if the barcode can't be read, the number is keyed in using a keyboard
the barcode is the key field in the stock file
the barcode is searched for in the stock file
until a match is found
(if no match, error message sent back to POS)
If match found, the appropriate record is accessed
the price + description of goods is sent back to the POS terminal
the stock level in the record is found and 1 is subtracted for each item bought/scanned
the new stock level is written back to the file
if stock level <= re-order value/minimum stock level, then automatic re-ordering takes place
the supplier file is accessed to gain necessary information to permit ordering to take place
when goods are ordered, a flag is assigned to the item to indicate an order has been initiated
this is repeated until all the barcodes in the customer basket have been scanned
when new goods arrive, the barcodes on the cartons are read and the stock file is updated accordingly [5]

(b) 1 mark for device + 1 mark for reason

keyboard
to key in barcode numbers if barcodes don't scan correctly

magnetic stripe reader
to read loyalty cards/debit cards/credit cards

printer
to produce itemised bill/receipt for customer

speaker/beeper
to produce beeping sound to acknowledge barcode has been read OK or to indicate an error when barcode failed to read correctly

LCD screen
to show prices of good scanned/total cost of goods bought

touch screen
select item if fresh food bought which may have no barcode [4]