

## **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.

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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]

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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]

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**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]

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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]

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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

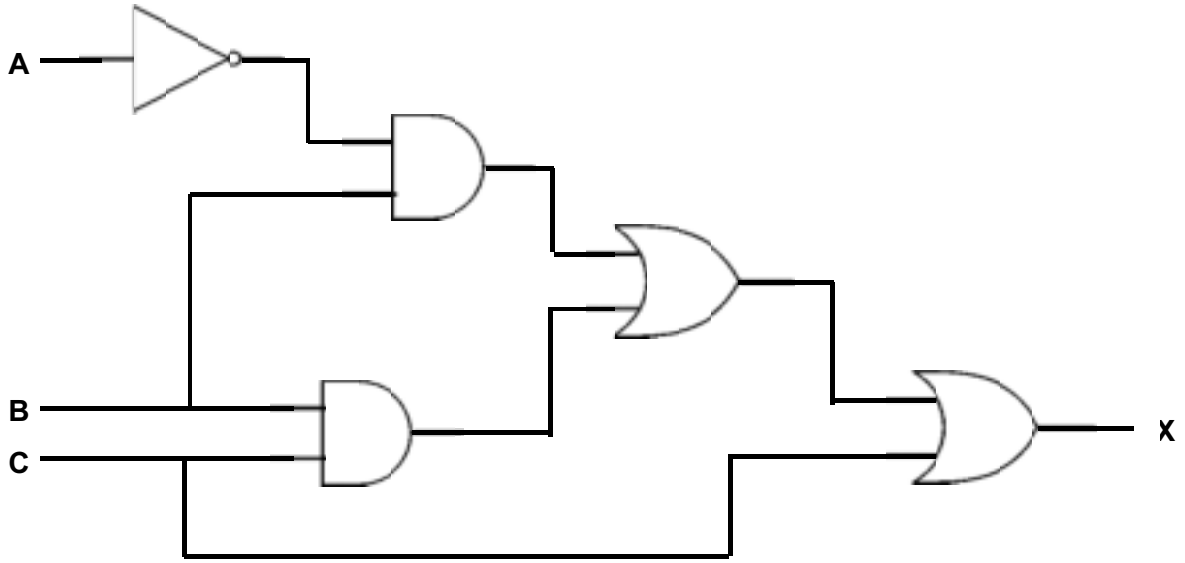
if value <= 0 then output a message and indicate position in array where erroneous data is stored

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]

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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]



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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]

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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  $\leq$  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]