

MARK SCHEME for the October/November 2013 series

9691 COMPUTING

9691/12

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 **five** from:

- answers are represented by marks on paper in particular positions
- the answer sheet is input into OMR reader/answers are scanned
- reflection of light from the marks is different to that reflected off the background paper
- the information read is converted into digital values
- (the reader takes note of the position of the marks) and reports the coordinates of the marks
- position determined by timing bars at the side (of the survey form)
- only the position of the marks is recognised, not the marks themselves
- the positions are **compared** with a template of correct positions stored in the computer
- the number of matches between the template and the person's attempt provides the final indication of how many answers were correct
- mention what happens if the person doing the test fills in too many lozenges/corrects an answer
- mention what happens if person filling in form used non-reflective ink/use of special ink/use of special ink prevents OMR reading text. [5]

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

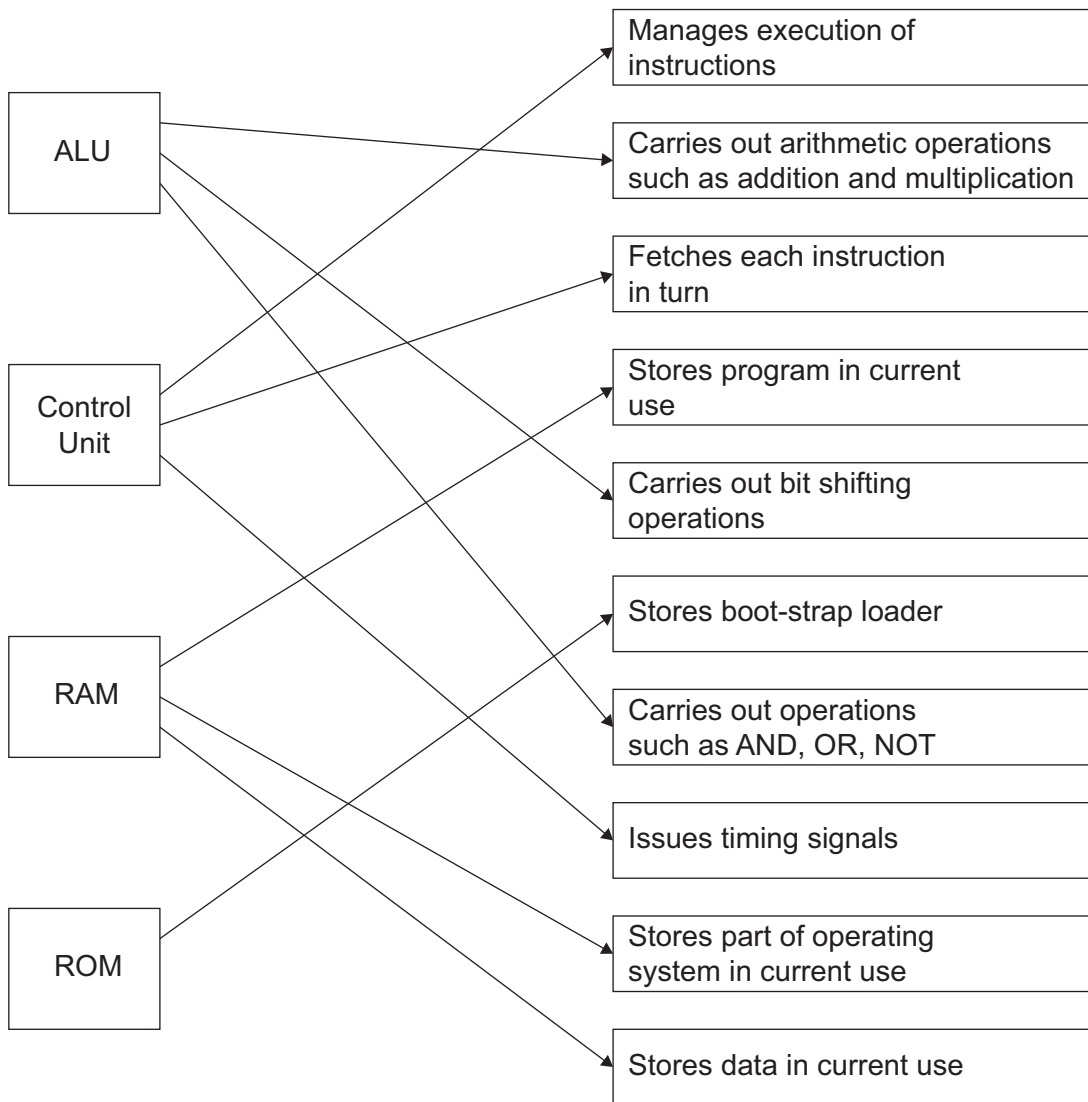
- software that can reduce the size of files/to save memory
- without losing any of the information contained in the file
- example of how this works
- for faster file transmission
- if attachment sizes are limited [2]

(ii) Any **two** from:

- text file/pdf
 - photographic files (JPEG)/image
 - sound files (MP3/4)/video files
 - ZIP/TAR/GZIP
- (accept description rather than name the file type) [2]

2 If there are 11 or more lines –

1 for each additional line



[10]

Note:

ALU maps to items:	2, 5 and 7
Control Unit maps to items:	1, 3 and 8
RAM maps to items:	4, 9 and 10
ROM maps to items:	6

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3 (a) Any **two** from:

- transmission can be in both directions at the same time
 - along several data wires/lines/one data line per bit/1 byte at a time
- [2]

(b) Any **two** from:

- to establish a set of rules before data transmission...
 - rate of transmission (baud or bps)
 - whether transmission is to be synchronous or asynchronous
 - whether serial or parallel transmission
 - whether data is transmitted in half duplex or full duplex mode
 - both ends use same parity
 - data transmitted in both directions at same time so protocols needed to control direction of data travel
- [2]

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4 (a) 1 mark for name + 2 marks for features

- CAD

features: can be given if wrongly named

- 3D (modelling) is possible
- can calculate the cost of building each “ride”
- has features such as rotate, zoom, vector diagrams ...
- can carry out simulations on each “ride”
- create engineering drawings/blue print
- library of parts (using other “rides” as a template)
- links into CAM
- prototype

[3]

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

- if monitoring safety aspects, e.g. corrosion, temperature, pressure...
- sensors on the “rides” will constantly send data back to computer/sends continuous signals to the computer
- the data will be converted into digital format
- sensor data will be compared to engineering data stored in computer if any values are out of specification
- computer shows a flashing red graphic on screen ...
- ... or computer triggers an audible warning
- camera data sent to computer
- compares image against already stored images
- sends warning to control room if significant differences detected
- if monitoring “rides”, images are compared frame by frame for safety

[4]

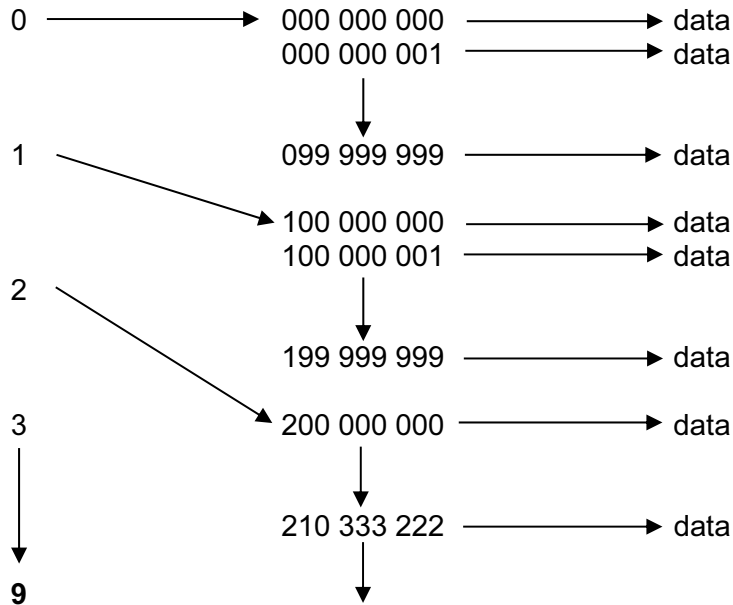
(c) Any **four** points from:

- graphics are animated to show movement of “rides”
- use of graphics to represent the “rides”
- consistent layout on all 3 screens
- reasons why you need three screens (grouping ride types etc.)
- sensor data and “rides” graphics show GREEN if OK/RED if NOT OK (red for danger)
- use of flashing colours to warn of problems
- interface should be easy to use/understand/interpret
- ability to navigate easily from screen to screen/“ride” to “ride”
- by clicking/selecting a graphic, status + history can be shown on screen
- use of touch screens and trackerball to select and navigate

[4]

- 5 (a) – items held in logical/numerical order
 – using barcode/ID (to determine the order) [1]

(b) example diagram:



marking points (either refer to diagram or a description of diagram):

- digits 0 to 9 used (as in diagram)
- as index – each leading to sequence of barcodes
- each barcode/product ID points to data
- item with barcode/product ID 210 333 222 found and data (e.g. price) retrieved [3]

6 (a)

counter values			coloured lights (output)		
A	B	C	R	G	Y
0	0	0	1	0	0
0	0	1	1	0	0
0	1	0	1	0	0
0	1	1	1	1	0
1	0	0	0	0	1
1	0	1	0	0	1
1	1	0	0	0	1
1	1	1	0	1	0

(1 mark per 2 **ROWS** as shown in diagram)

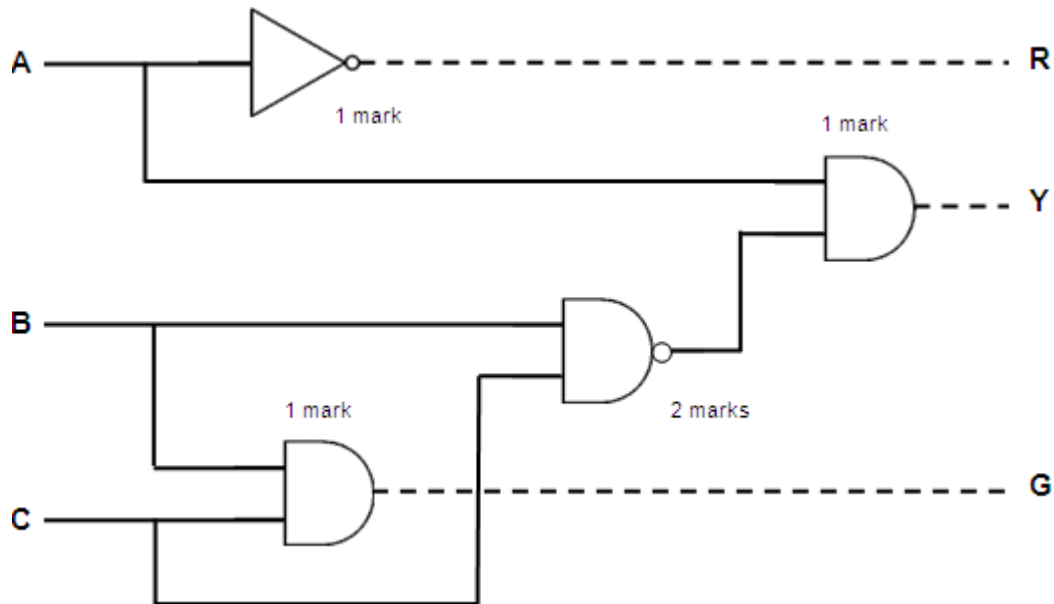
[4]

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(b) There are **three** possible solutions here. But in ALL three cases:

- The logic circuit for R is worth 1 mark
- The logic circuit for G is worth 1 mark
- The logic circuit for Y is worth 3 marks

Option 1

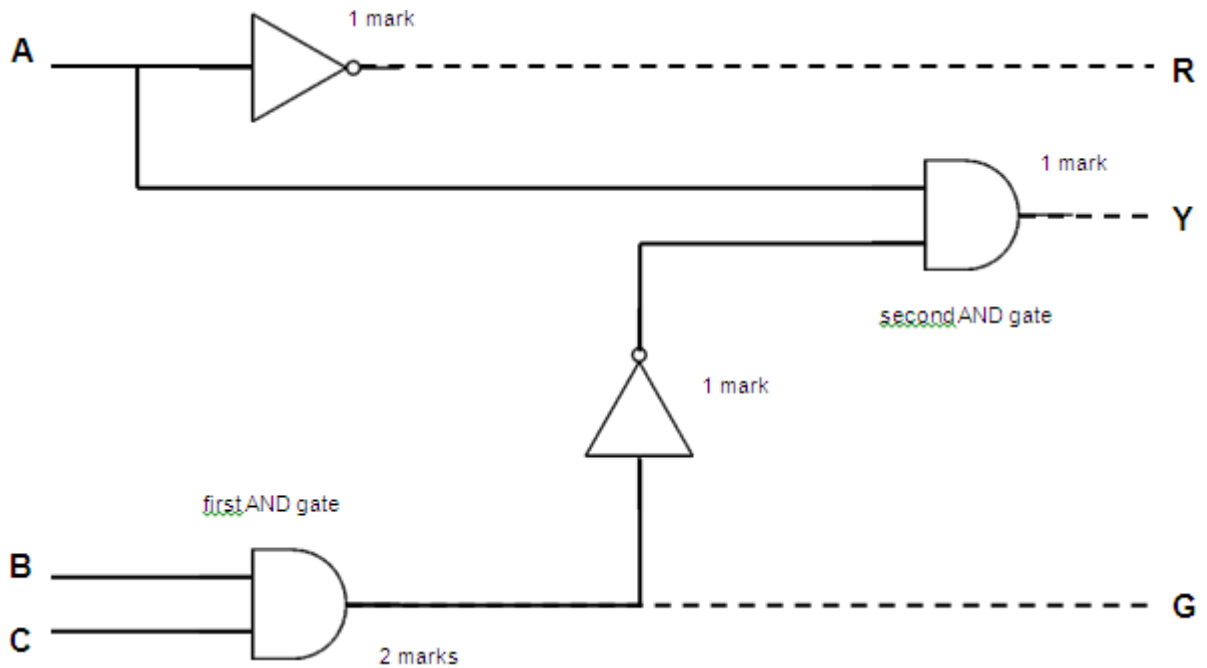


Marking points:

- for circuit “R” 1 mark for correct NOT gate (showing correct input and output)
- for circuit “G” 1 mark for correct AND gate (showing correct input and output)
- for circuit “Y”:
 - 2 marks for the NAND gate (MUST have both inputs correct to get the marks)
 - 1 mark for the AND gate (MUST have correct inputs and output to gain the mark)

[5]

Option 3



Marking points:

- for circuit "R" 1 mark for correct NOT gate (showing correct input and output)
- for circuit "G" 1 mark for correct AND gate (showing correct input and output)
- for circuit "Y":
 - 1 additional mark for the first AND gate
 - 1 mark for the NOT gate following straight after the AND gate
 - 1 mark for the second AND gate (MUST have correct inputs and output to gain the mark)

[5]

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7 (a) NOTE: need different validation check for each of the **three** fields:

If a name and description are both given they **MUST** match for a mark.

(i) **present salary**

- range check; for example, \$1000 to \$5000 per week
- type/character check
- salary must be digits only
- presence check

(ii) **staff name**

- type/character check
- name must be non-numerical characters only
- string
- presence check

(iii) **staff id**

- format check (i.e. format nn/xxxxxxx)
- presence check

[3]

(b) (i) **title and sex**

- consistency check
- if someone selects **Mr** then they can't choose **female** in the sex field

(ii) **date of birth and date joined company**

- check that second date is later than date of birth field

[2]

(c) 1 mark for choice of method + 2 marks for correct description

Description marks **MUST** match stated method

parity check

- number of one in the byte should be even or odd (i.e. even parity or odd parity)
- both sender and receiver use the same parity
- if byte arrives at destination with wrong parity, error has occurred
- use of horizontal and vertical parity checking to identify incorrect bit
- parity bit is sent with the byte/data

check sum

- bytes added together at sending stage
- value from addition/checksum sent with transmitted bytes
- received bytes go through same addition process
- the two sums are compared; if different a transmission error has occurred

[3]

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- 8 (a) 1 mark for method + 1 mark for benefit
(If benefit described as part of description, allow carry over and award marks)

observation

- systems analyst can see what is happening first hand
- systems analyst doesn't have to rely on biased opinions
- does not take up client time

(written) questionnaires

- questions are pre-determined/fully tested questions
- people can take the questionnaires away so systems analyst doesn't need to be present
- useful where there are a large number of users

interviewing

- systems analyst can vary/extend the questions according to answers given or depending on who is being interviewed
- answers tend to be more honest and embellished when compared to method of questionnaires

(examine) documentation/data flows

- systems analyst can use this method to describe what hardware and software may be required
 - this method can be used to determine file structures, etc.
 - to determine input and output requirements
 - to determine data volumes/size
- [6]

(b) (i) Any one from:

- for analyst/programmers
 - in case of further development/upgrades
 - maintenance
 - in case there are errors in the system and need to be corrected
- [1]

(ii) Any three from:

- systems flow diagrams/DFDs/JSD
 - variables used/data structures/data dictionary
 - hardware/software requirements
 - purpose of the system/log of any revisions
 - algorithms/program flowcharts/JSP
 - annotated listing/programming code
 - testing procedures/test plan
 - test data and results
 - validation routines
 - meaning of error messages from the system
- [3]

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9 (a) – (expert system) shell [1]

(b) 1 mark for each part

user interface

- allows system to ask questions and user to answer them
- very often simple Yes/No answer dialogue
- allows communication between a user and the expert system

explanation system

- tells user how system made its decision(s)...
- ...usually in response to user asking WHY

inference engine

- applies rules in the rule base to the knowledge base
- makes reasoned conclusions using information from facts/knowledge base
- acts as a reasoning engine

(knowledge base) editor

- allows creation of hierarchical knowledge base
- allows user to create rules for rules base
- setting knowledge base properties
- allows creation/changing/updating (of knowledge base)

rule(s) base

- made up of a series of inference rules
- allows inference engine (to draw conclusions)
- allows a set of rules to draw up a conclusion

knowledge base

- a type of database...
- ...which allows complex data storage and retrieval
- contains data gathered from the experts

[6]

(c) Any **three** from:

- lack common sense
- errors in knowledge base can cause problems and lead to incorrect conclusions
- cannot adapt to changing environment unless the knowledge base is updated on a regular basis/out dated
- expensive system to set up
- users need extensive training which is expensive and time consuming
- limited to what is stored in the expert system/cannot respond to usual circumstances [3]