

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

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MARK SCHEME for the October/November 2014 series

9691 COMPUTING

9691/13

Paper 1 (Written Paper), maximum raw mark 75

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- 1 (i) Any **one** point from:
- directs and coordinates all other parts of the computer system
 - controls and directs operations of the computer system
 - fetches/retrieves computer instructions (in sequence)
 - decodes/interprets each instruction
 - then directs other parts of computer system in their implementation/execution [1]
- (ii) Any **one** from:
- all the data and instructions computer needs/is using are stored here
 - contains RAM/ROM [1]
- (iii) Any **one** from:
- unit which performs arithmetic operations
 - and bit shifting operations
 - and logic operations (such as AND, OR, XOR (etc.))
 - designed to perform integer calculations [1]
- 2 (a) (i) Any **two** points from:
- obsolescence/out of date
 - specific examples e.g. floppy disk, mag tape etc.
 - not compatible with new equipment
 - key components no longer manufactured/spares are hard to find
 - software support no longer in existence/problems with maintenance [2]
- (ii) Any **two** points from:
- upgrading/updating of system (using parts which are outside normal specified range)
 - buying enough spare parts to meet system's forecasted lifetime requirements
 - part substitution (different parts with similar fit are used where possible)
 - redesign system to allow introduction of new components
 - emulation (parts with identical function and fit are made from new technologies)
 - aftermarket sources (third parties continue to make "obsolescent" parts)
 - training in-house programmers/maintenance personnel [2]
- (b) Any **six** points from:
- corrective ...
 - ... solve any bugs/problems in the software
 - 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 [6]

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3 (a) 1 mark per point. Maximum of 3 marks for baseband and maximum of 3 marks for broadband

baseband

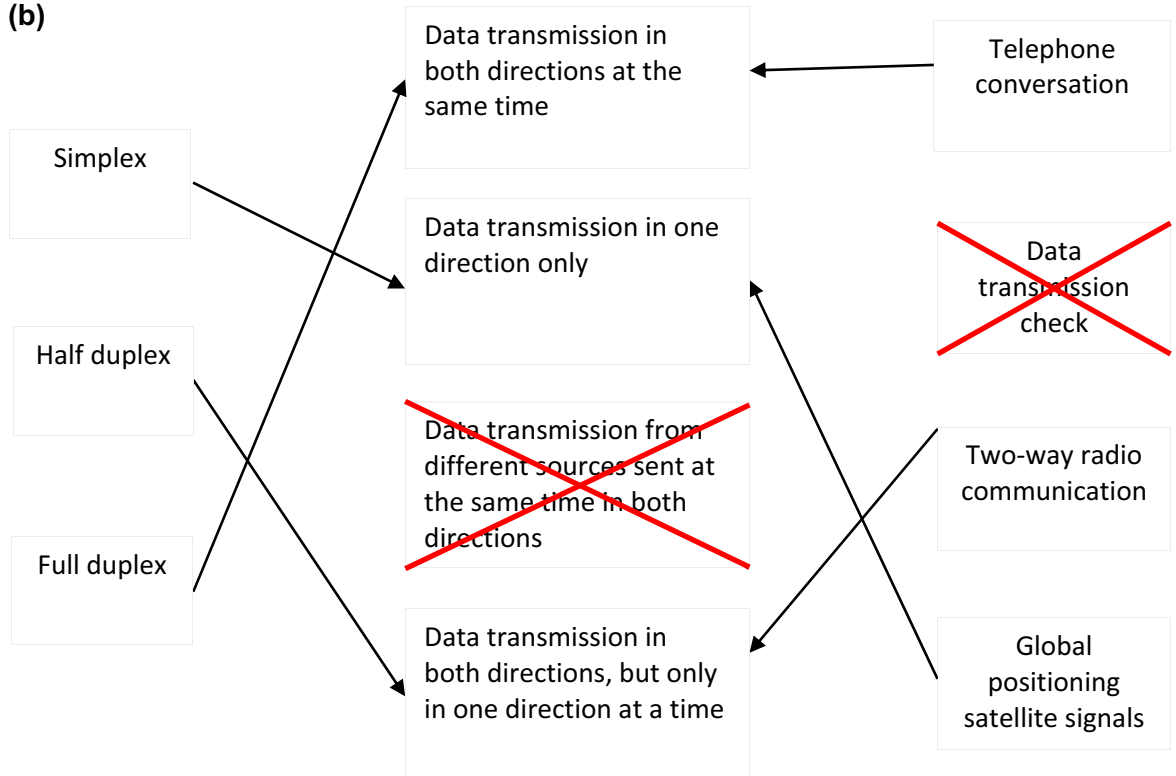
- data sent as digital signals
- through the media as a single channel
- that uses entire bandwidth of the media/one frequency
- it is bi-directional
- (frequency-division) multiplexing is not possible

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/wires
- multiplexing is possible using this method

[4]

(b)



(1 mark for each correct connection)

[6]

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4 (a) – a program that can self-replicate
can delete or corrupt data from a computer system
malicious code often installed without the user’s knowledge

- (b) Any **three** from:
- install and run/use anti-virus software
 - update anti-virus software on a regular basis
 - avoid programs/software/downloads from unknown sources
 - never “double click” on email attachments which are executable i.e. contain .exe, .com or .vbs
 - install and run/use a firewall (which screens incoming Internet and network traffic)
 - install and run/use anti-spyware software (which works in conjunction with the anti-virus to stop viruses doing any harm to the computer)
 - avoid suspicious web sites
 - delete emails from unknown contacts without opening
 - avoid using media from unknown sources
- [3]

5 (a) 107 [1]

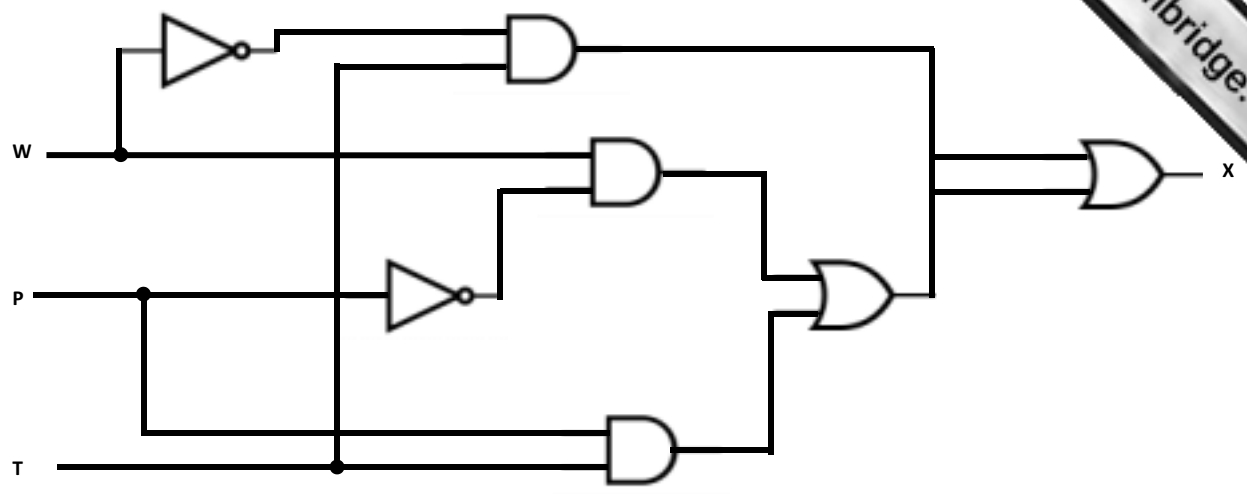
- (b) (i) – 2 dimensional
– array [2]

(ii) Each correct answer (shown in bold (red)) = 1 mark

```
DECLARE BinaryNumber [2, 8]: array OF INTEGER
PlaceValue ← 128
FOR index ← 1 TO 8
    INPUT BinaryNumber [ 2 , Index ]
    BinaryNumber [ 1 , Index ] ← PlaceValue
    PlaceValue ← PlaceValue / 2
ENDFOR
```

[4]

6 (a)



(corresponds to: $[W = 1 \text{ AND } P = \text{NOT } 1] \text{ OR } [T = 1 \text{ AND } P = 1] \text{ OR } [W = \text{NOT } 1 \text{ AND } T = 1]$)

1 mark for each correct logic gate in correct position – [7]

(b)

input W	input P	input T	output X
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

1 mark

1 mark

1 mark

1 mark

[4]

7 (a) **noise**

- microphone
- sound sensor/detector

air pollution

- NO_x monitor/sensor/detector
- CO₂ monitor/sensor/detector

[2]

(b) Any **one** from:

- use portable devices (to download data each month from solid state memory)
- transmit data to remote computer at research site automatically over cellular network
- use a telephone network and manually connect to data logger and request it to send data over internet link

[1]

(c) Any **three** from:

- use of macros...
- in spreadsheets and databases
- most recent data compared to last 2 or 3 months data already stored in database or spreadsheet
- new data loaded into spreadsheet
- graphs drawn showing results over last 2 or 3 months
- graphs produced showing results for every month over last 4 years
- compare results/graphs with “normal” data
- use of “average” or “trend” function on graphs
- use of “rolling average” to show changes over long period
- use data to predict noise and air pollution levels in 5 years, 10 years ... time

[3]

8 (i) CLI uses a keyboard to allow user to key in commands such as load a file/mouse and touch screens are used in GUI environment where icons represent applications to be launched [1]

(ii) the two binary numbers have **odd values** (113 and 147) but actually have **even parity** (both binary numbers have four 1s) [1]

(iii) central heating systems need to respond quickly to changes in temperature so need to run in real time/batch processing would not allow a fast/immediate response [1]

(iv) WANs require external connections which are usually through telephone lines/devices inside buildings (such as routers, modems, ...) can operate using Wi-Fi connections but these devices need to link to the outside world via wired telephone connections [1]

(v) stacks only permit *last in first out (lifo or filio)* principle/structures that use *fifo* are usually called queues [1]

- 9 (a) 1 mark for device + 1 mark for reason
- touch screen – easy to use in a garage environment
 - easier navigation
 - more difficult to input incorrect data into system

- (b) Any **three** from:
- expert system asks further questions
 - ... based on response to earlier questions
 - mechanic inputs further symptoms/faults
 - expert system uses inference engine to
 - search the knowledge base
 - using the rules base
 - to find faults that match symptoms/faults input
 - gives % probability that each solution is correct
 - suggests what mechanic should do next
- [3]

- (c) Any **two** from:
- use live data/test where faults known
 - input data with known outcomes
 - compare expert system results with actual results from live data
 - if different results, experts system is amended
 - if results within acceptable range, try out new data and see how successful system is
 - test data should be very varied to test all possible scenarios
- [2]

10 (a)

Question	True	False
Custom-written software takes a long time to develop	✓	
Custom-written software isn't fully tested		✓
Custom-written software won't have any technical backup		✓
Off-the-shelf software is usually cheaper because costs are shared	✓	
Off-the-shelf software is always compatible with other software		✓

[4]

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(b) 1 mark for each benefit + 1 mark for a description

off-the-shelf:

- off-the-shelf software probably has an already trained work force
 - therefore training costs are saved
- off-the-shelf software has many user groups/blogs to gain advice/help
 - therefore more likely to get help if a problem occurs
- a wide diversity of users ensures off-the-shelf software is fully tested under a number of different scenarios ...
 - less likely to encounter problems
- version xxx is probably already on the market
 - upgrades will become available throughout the life of the software without having to pay for any further development

custom-written:

- custom-written software does not contain unwanted features
 - therefore easier to use and more efficient running
- custom-written software can be written to interface with all the company's existing software
 - off-the-shelf software will only be tested against widely available software; the company may have specialist software on its system which will not have been tested with off-the-shelf software

[4]

(c) Any **four** from:

- purpose of the system
- how to (load and) run the software
- how to save (files)
- how to carry out a search
- how to sort the data
- how to add/delete/amend (records)
- screen layouts (input and output)
- software requirements
- sample runs (with test data and test results)
- error handling/meaning of errors
- troubleshooting guide/FAQs
- tutorials
- licence agreement/warranty agreement
- customisation

[4]