Cambridge International AS & A Level

Cambridge International Examinations
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COMPUTING **9691/12**

Paper 1 Written Paper **May/June 2016**

MARK SCHEME

Maximum Mark: 75

Published

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1 (a) optical **[1]**

(b) Any **two** from: **[2]**

– a two-way flow of information/data // information studied and then student keys in question answer // communication between
– between a computer and a user
– involves real-time feedback
– software/system that presents choices
– depending on earlier actions by the user / previous input

(c) The CD-ROM has a large storage capacity // large number of lessons can be made available
The content cannot be changed / rewritten **[1]**

(d) (i) Any **one** from: **[1]**

– ROM is read only / cannot be written to
– can't store the user's progress on the CD-ROM

(ii) Must install onto a device / by example, hard disk – which can be written to **[1]**

(e) Any **three** from (max of 2 marks for verification and max of 2 marks for validation) **[3]**

Verification:
– visual check on data / for accuracy / consistency …
– … where keyed in data is compared to source data/paper copy

– double data entry …
– … where data is keyed in twice and compared by computer software

– when data is transmitted from a source computer to a destination computer.
– … the copy of the data is compared – byte by byte – with the original
e.g. checksum / parity

Validation:
– check that data is reasonable/within criteria/meets the requirements
– …include range check, length check, type check, format check (any one)

2 (a) Start at 4 marks and –1 mark for each error **[4]**

Step	Sequence number
Sensor reading is sent to the microprocessor	**3**
Microprocessor checks sensor reading against stored temperature value	**4**
Temperature reading is taken by the analogue sensor	**1**
If the sensor reading is less than the stored value, the microprocessor sends a signal to switch on the heating	**5**
Sensor reading is converted into digital using an ADC	**2**

(b) 1 mark for sensor and 1 mark for reason.

	Sensor	Reason	
(i)	microphone	can detect sound of footsteps, breaking glass, ….	**[2]**
	acoustic	can detect sound of footsteps, breaking glass, ….	
	infra-red	detects movement (broken beam) or heat change	
	pressure	detects weight of person entering building	
	magnetic	detects if a door / window has been opened	
(ii)	light	detects level of ambient light (**not** "when it gets dark")	**[2]**
(iii)	proximity	detects movement	**[2]**
	infra-red	each time person breaks beam	
	pressure	each time person steps on pressure pad	

Reasons **must** be linked to the sensor type.

3 (a) Any **two** from: **[1]**

– only one user <u>at a time</u>

(b) (i) fast data transfer rate **[1]**

(ii) Any **two** from: **[2]**

- downloading/streaming on-demand videos/music files
- video/VoIP calls/video conferencing
- download/upload large files e.g. photos
- online gaming
- valid e-commerce examples

(c) Any **two** from: **[2]**

- allows use of telephone and Internet / multiple devices at the same time
- always "on"/no need to connect each time
- faster data transfer rate (than old dial up systems)

(d) (i) 10 **[1]**

(ii) 8 seconds **[1]**

(iii) 800 seconds **[1]**

(iv) Any **one** from: **[1]**

- over-capacity on network lines
- computer virus (sending out spurious messages)
- cabling/modem/filter fault
- connection uses copper cable which is a distance from the main telephone switch

4 (a) –1 mark for each error (start at 4 marks) **[4]**

1 Identification of the problem
2 Feasibility study
3 Information collection/Fact finding
4 Analysis of the problem
5 Design of the system
6 Development and testing
7 Installation of the system
8 Maintenance of the system

(b) (i) Any **three** from: **[3]**

- questionnaires + some description
- interviewing + some description
- observation + some description
- looking at existing documentation + some description

(ii) 1 mark for name + 1 mark for description **[4]**
- corrective + some description
- adaptive + some description
- perfective + some description

(c) (i) Any **two** from: **[2]**

- the processes which make up the system
- the input(s) to a process
- the output(s) from a process
- the flow of data between processes

(ii) analysis // design **[1]**

5 (a) 1 mark per group of two correct outputs: **[4]**

INPUTS			Workspace	OUTPUT X
A	B	C		
0	0	0		1
0	0	1		1
0	1	0		1
0	1	1		0
1	0	0		1
1	0	1		1
1	1	0		1
1	1	1		1

(b) **[3]**

((A . B)	**+ (B + C))**	**. C**
((A AND B)	OR (B OR C))	AND C
((A=1 AND B=1)	OR (B=1 OR C=1))	AND C=1
< – – 1 mark – – >	< – – 1 mark – – >	< 1mark >

(c) Circuit 1 – NOR gate **[2]**

Circuit 2 – NAND gate

6 (a) **[2]**

- use of digital video or digital still camera
- use of optical character recognition (software)
- compare the symbols with a library of characters.

(b) (i) touchscreen **[1]**

(ii) Any **two** from: **[2]**

- on entry to car park, date and time stored (e.g. value X)
- on paying the fee, new date and time stored (e.g. value Y)
- computer calculates (Y – X)
- and multiplies number of hours by car park tariff

(c) (i) Suitable value for 'empty space' **[2]**
Nested loop // described for each bay and each row
Correctly declare and dimension the array

(ii) YES // or equivalent **[1]**

(iii) Any **three** from: **[3]**

Nested loop
Searches one row – then all bays
Repeat for further row(s), until car registration found
Output 'Error' if input car registration is not found

(d) extend the upper bound for the 'bay' / 'row' subscript by one and use subscript 9 to hold a digit for the level (1 to 10). **[2]**

OR …

Use a 3–D array
The third subscript is the 'level'

7 (i) **[2]**

- backed up data/files may already have a virus
- so recovery procedure may re-infect computer

(ii) Any **two** from: **[2]**

- a stack operates on 'first-in, last-out'
- a stack requires only one pointer
- this is a description of a queue

(iii) Any **two** from: **[2]**

– both binary numbers have odd number of 1s (and 0s)
– so they must both have odd parity
– even / odd (denary) values have no bearing on the parity

(iv) Any **two** from: **[2]**

– broadband sends data as analogue
– each transmission is assigned only a portion of the bandwidth
– allowing multiple transmissions at the same time across the media
– description given is that of baseband

(v) Any **two** from: **[2]**

– ROM is read only
– buffers use RAM memory
– buffer contents always changing / buffers store data temporarily