CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International Advanced Subsidiary and Advanced Level

MARK SCHEME for the May/June 2015 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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CAMBRIDGE
International Examinations

1 (a) 1 mark for each example + 1 mark for description of technology

magnetic

- hard disk (drive) / floppy disk / magnetic tape
- make use of the magnetic properties of materials such as iron
- magnetic areas/flux represent 1s and 0s
- magnetic field is either clockwise or anticlockwise to represent 0 and 1
- concentric tracks and sectors **[2]**

optical

- DVD (R/RW/ROM/RAM) / CD (R/RW/ROM) / Blu-ray discs
- these use "pit" and "lands" to represent 1s and 0s on a light sensitive layer
- use red or blue lasers to read the data on the light sensitive layer **[2]**

solid state

- pen drive/flash drive / SD/XD cards/memory/compact flash cards / solid state drives
- uses EEPROM technology
- use of NOR/NAND transistors/cells
- use of semi-conductor chips
- by applying precise voltages to transistors, a unique pattern of 0s and 1s is stored (NOT faster access speeds)
- less likely to be erased by magnetic fields **[2]**

(b) Any **two** from:

- more robust / no moving parts if dropped less likely to be damaged
- lightweight // physically small
- don't have to wait to reach "running speed"// latency
- low energy consumption
- low heat generation
- faster access time
- More read / write cycles // longer longevity
- less likely to be affected by magnetic fields **[2]**

2

The following binary pattern 1010011000111101 is stored in X bytes.
What is the value of X?

A stack contains the values shown on the right.
X ← POP
What is the value of X?

6
8
10

Odd parity is used as an error check when sending data. If X represents the parity bit, what is the value of X in the byte below?

X 1 1 0 0 0 1 0

What denary value, X, is represented by the binary number below?

0 0 0 0 1 1 0 0

What is the value of X in the following logic gate?

An array, `Number`, contains:

4 8 2 6
4 6 4 8

`X ← Number[2,4]`
What is X?

If $2^x = 1024$, what is the value of x?

0

1

2

4

6

8

10

12

[7]

3 1 mark for each feature (max of 2) + 1 mark for naming I/O device + 1 mark justification of chosen I/O device

(a) CAD

(i) features

- 2D/3D modelling
- use of wire frames
- library of parts
- auto-calculation of final cost of part
- auto-calculation of weight of final part
- zoom, rotate, colour, ….. (utilities)
- kinematics
- link into CAM
- virtual / simulated testing **[2]**

(ii) I/O devices + justification

- light pen – move/draw/select objects on a **CRT screen**
- trackerball – move/draw/select objects from any type of screen
- spacemouse/ball – allows users to manipulate 3D objects on screen
- **large** monitor – large screen allows intricate details (e.g. circuits) to be seen
- plotter – print out of large, accurate drawings/blueprints
- 3D printer – print out a working prototype (at much less cost)
- graphics tablet and stylus – allows the operator to draw naturally

Accept any reference to computer-controlled lathes etc. **[2]**

(b) Spreadsheet

(i) features

- carry out calculations on data in cells
- automatically produce graphs/charts from data
- make use of formulas
- use of built-in functions (such as replicate, MAX, COINTIF, …….)
- macros to do auto-calculations (etc.)
- "what if" predictions **[2]**

(ii) I/O devices + justification

- printer – printout report to produce hard copy **[2]**

(c) Presentation

(i) features

- slide transitions
- integrate multimedia (sound/movies/animation) into presentation
- embed links to websites into presentations
- introduce attractive colours/fonts/etc. to make it interesting/clear

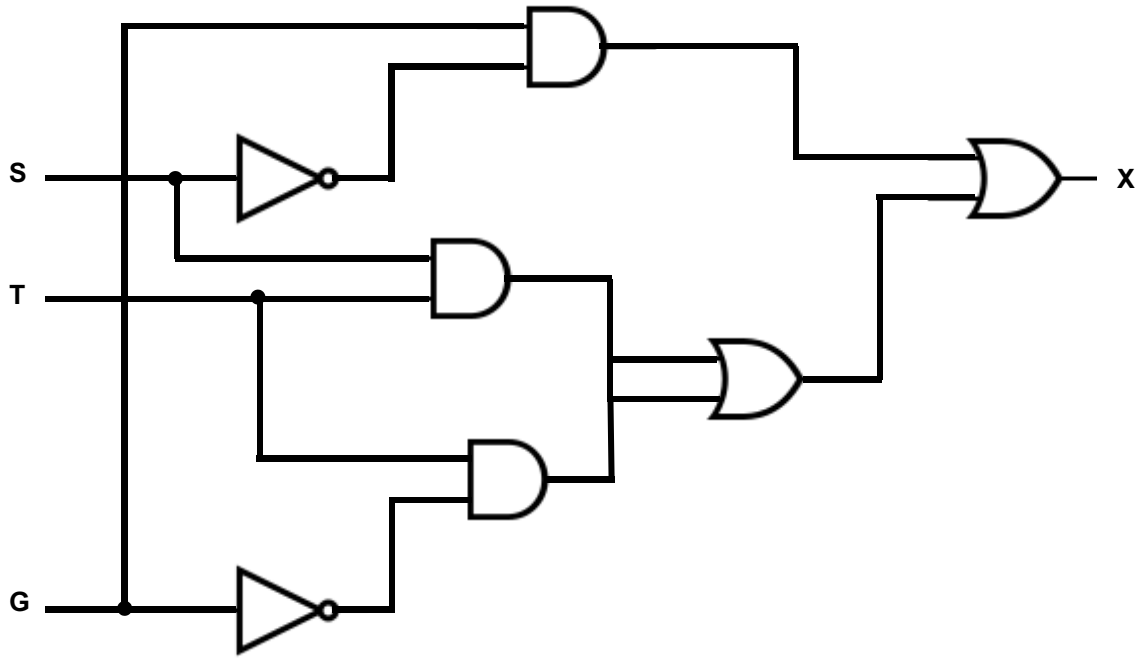
[2]

(ii) I/O devices + justification

- pointing device – to select items in the presentation
- microphone – to do “voice-overs”
- multimedia projector – allow presentation to be projected onto large screen
- speakers – to hear “voice-overs”/music/videos
- large screen – so audience can easily see the presentation
- printer – to produce notes to accompany slide show/presentation

[2]

4 (a) 1 mark for each correct gate (look out for alternative answers that work)



Allow a single triple input OR gate at the right hand side

[7]

(b) 1 mark for each pair of outputs – shown highlighted in table

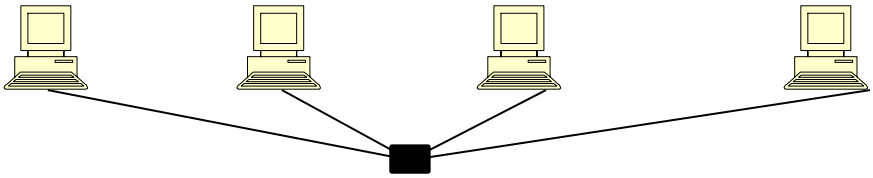
Inputs			Workspace	Output
S	T	G		X
0	0	0		0
0	0	1		1
0	1	0		1
0	1	1		1
1	0	0		0
1	0	1		0
1	1	0		1
1	1	1		1

[4]

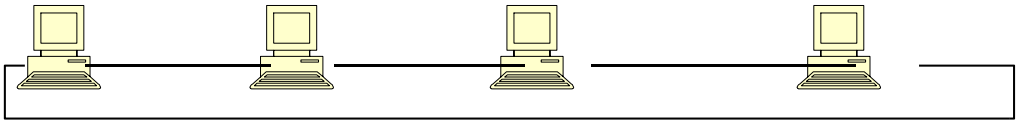
5 (a) 1 mark for each correct wiring of network topology. 1 mark for switch in star

Star

Allow 1 mark if candidate uses one node as the switch and all lines lead to it.

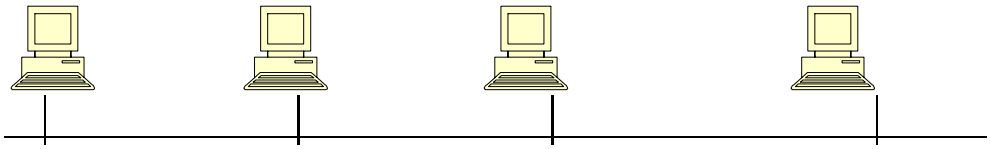


Ring



Bus

No mark if lines run directly from node to node



[4]

(b) 1 mark for each benefit, max 2 per topology

Star

- failure of a node or node cable doesn't affect other nodes
- easier to troubleshoot since only one node is affected if a cable break occurs
- it is simpler to add extra nodes/expand network since extra nodes don't affect
- overall performance of network
- each node can use a different type of data cable / different transmission speeds
- it is a more secure type of network

[2]

Ring

- works well under heavy load
- it is possible to form very large networks
- it is relatively inexpensive and simple type of network to install
- uses a token so only 1 device can transmit at a time so no clash and no need
- for re-transmission
- does not rely on a server for control

[2]

Bus

- it is the least expensive network to set up
- it is very flexible since nodes can be added or removed without affecting the
- rest of the network
- failure of one node doesn't affect the rest of the bus network (unless there is a
- main cable failure!)

[2]

6 (a)

	0	1	0	1	1	1	1

[1]

(b) channel 75 **[1]**

(c) error message would occur
channel 84 is not available // nothing would happen **[1]**

(d) 1

[1]

(e) bits sent one at a time along a single channel

transmission is in one direction only **[2]**

7 (a) Any **four** from:

- obsolescence of existing equipment / hardware out of date
- inability to repair existing equipment/obtain spare parts
- existing hardware can't utilise new software
- better hardware / software NOT newer hardware/software
- company that produced original software/hardware is no longer in business
- no longer possible to get technical support for existing hardware/software
- changes in technology over the years
- changes of health and safety regulations
- expansion of the power station
- need to improve the overall reliability
- changes to rules/legislation
- changes in company policies
- greater automation required // reduce staff costs **[4]**

(b) Direct / big bang

Pilot

Parallel

Phased **[4]**

8 (i) data read at a POS terminal needs to be real time and not batch [1]

(ii) entering data twice into a computer is an example of verification (not validation)

examples of validation would be length check or type/character check [1]

(iii) a queue is an example of a FIFO structure

stacks use LIFO and not queues [1]

(iv) ROM memories are non-volatile, permanent memories

the properties described (volatile and temporary) refer to RAM [1]

(v) data that can only be transmitted in one direction is called simplex transmission

Full duplex refers to data transmission in both directions at the same time. [1]

9 (a) 1 mark for 4 correct identifiers, 1 mark for 4 correct stages added.

	1	2	3	4
A	A0046/			
B			B1504/3 B1600/3	
C				
D				D0088/4

[2]

(b) – the additional information is available on demand
– when mouse/finger hovers over graphic/right-click mouse, (on the icon)
– hotspot/rollover displays other data items
– pop up / drop down box appears with extra details

[2]

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

For example:
– sensor detects the presence of a bicycle …
– .. at specific points of the conveyor belt
– sensor sends signal to computer system …
– including the bicycle code
– computer maps the sensor number to the current stage
– suitable sensors: RFID, barcode reader
– software responds to sensor to move bicycle to the next stage
– process control software

[4]