

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
GCE Advanced Level

**MARK SCHEME for the October/November 2009 question paper  
for the guidance of teachers**

<p><b>9691 COMPUTING</b></p> <p><b>9691/32</b>      Paper 32 (Written), maximum raw mark 90</p>
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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.

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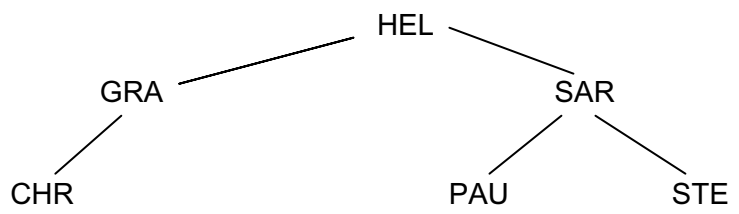
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- 1 (a) – Simplest and fastest/less disruption  
– Requires staff to be fully trained before implementation  
– All data files must be complete  
– If it doesn't work then there is no fallback and store will shut  
– Installation must be done quickly while store shut  
(1 per –, max 3) [3]
- (b) – Only part of the system implemented/remainder on old system  
– Means that any bugs are ironed out before remainder of checkout system goes online  
– e.g. New weighing equipment installed at terminals, remainder of system is the old system.  
– Staff do not need to learn whole system at once.  
(1 per –, max 3) [3]
- (c) – One checkout is fully implemented  
– Remaining checkouts stay on old system  
– Allows for staff to be trained, in turn  
– If system does not work, store stays open  
– Means that two versions of files need to be live.  
(1 per –, max 3) [3]
- 2 – Floating point processors/carry out calculations on floating point values as single units  
– Maths coprocessors/separate circuits which will act as floating point processors  
– Array processors/allow the same operation to be carried out simultaneously on a set of data, like the contents of an array.  
(2 per –, max 2 –, max 4) [4]

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- 3 (a) – Insert first value/CHO  
 – Compare second value with first (already inserted) and insert in correct place/CH  
 – Continue until last value inserted/BRI, CHO, DAN, ROG, SYG  
 (1 per –, max 3)
- (b) Following through from candidate's answer to (a):  
 – Read first value from each and compare/Compare BRI and ADA  
 – Write the lower value to new file/Write ADA to new file  
 – Read next value from successful file and repeat/COU and compare with BRI  
 – Until one file is empty, then copy remainder of the other file to new/ROG and SYG copied to new file after LOV.  
 (1 per –, max 3) [3]

(c) (i)



(1 per level, not node, max 2) [2]

- (ii) Rule to draw:  
 – Compare element with node  
 – If > then go right, if < then go left  
 – Insert at empty node.  
 (1 per –, max 2) [2]

- (iii) Rule to read: (using inorder traversal)  
 – Traverse left hand subtree  
 – Visit ROOT node  
 – Traverse right hand subtree  
 (1 per –, max 3. Order shown by arrow on diagram worth 2 and order of reading shown on arrow worth 1) [3]

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- 4 (a) – Instructions are either in machine code  
– or they are one to one with machine code  
– Using mnemonic codes for operations  
– Using labels for addresses of data  
– Used for controlling the computer/close to hardware  
– Allows direct manipulation of memory addresses  
– Contains a code for the operation to be carried out...  
– and a binary representation of the value to be manipulated/address of the value to be manipulated.  
– Different forms of addressing mentioned.  
– Different forms of instruction: Arithmetic/Jump/Control  
(1 per –, max 5) [5]
- (b) (i) – Prewritten/pretested/debugged when held in a library  
– A (self contained) section of code  
– Given a name which can be used throughout code to stand for whole procedure  
(1 per –, max 2) [2]
- (ii) – Linker is used to link the code of the procedure to the remaining code in the correct place...  
– this may differ when the procedure is used more than once.  
– Loader stores the code in memory and...  
– adjusts the memory addresses appropriately.  
(1 per –, max 3) [3]
- (c) (i) – Local variable only exists within a block  
– Global variable exists throughout program [2]
- (ii) – By value means that the specific values are passed in the procedure call  
– By reference means that the addresses of the values are passed. [2]
- (d) (i) – Passed by reference...  
– will differ for each student/subject  
– Global variable...  
– exists in more than one area of program.  
(1 per –, max 2) [2]
- (ii) – Local variable  
– Only used in the calculation/must not exist outside the procedure. [2]

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- 5 (a) – Needs to ensure that access will be efficient when stadium is built.  
– Too expensive to set up in real life  
– Too large a scale, would need large number of people  
– Would be far cheaper than paying for real life test  
– Allows simple changing of variables to conduct a series of tests  
(1 per –, max 3) [3]
- (b) – Number of automatic access points  
– Number of manned access points  
– Time for each person to go through each type  
– Number of people who will pay/with season ticket  
– Amount of time from arrival to kick off  
(1 per –, max 4) [4]
- 6 (a) – Enables easy navigation of the net/site...  
– by creating a logical path...  
– anchor in source document  
– is activated by clicking/which can be accessed by simple selection of an area of screen.  
– this then displays the target document of the link  
– use of hot area/hyperlink/inline link/embedded link/html.  
(1 per –, max 3) [3]
- (b) E.g.  
– Ability to divide screen into areas/frames  
– by using Head and Body...  
– Colour can be created  
– by specifying hex values of RGB in 6 digit hex number  
– Photographs can be inserted into preset areas  
– using JPG format  
– Animations/diagrams/maps... can be inserted into preset areas  
– using GIF format  
– Use different style sheets on different areas  
– setting fonts/colour/sizes...  
– Use tags in pairs  
– anything between tags will be formatted appropriately  
– Example tag/<B>  
– and use/embolden text until </B>  
(1 per –, max 3 pairs, max 6) [6]

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7 (a) (i) – Many to many.

(ii)



Mark Points:

- Use of a link table with a suitable name
- Both relationships correct. [2]

(b) (i) – A unique identifier for a record  
 – e.g. Member number [2]

(ii) – An attribute in one table which is primary key in another/acts as a link between tables  
 – e.g. Member number used in Loan table to identify who has borrowed a book. [2]

(iii) – An attribute (not the primary key) offering another identification for a record (not necessarily unique)  
 – e.g. Town in which they live is searched for all in Carnforth in order to send reminders about an event being held in the town. [2]

8 – Scheduling is used to provide an algorithm to be followed which...  
 – determines the order in which jobs are selected and length of time to be processed.  
 – e.g. of scheduling algorithm.  
 – Jobs are rated in importance according to...  
     – I/O requirements  
     – current length of wait  
 (accept any 2 criteria to max of 2).  
 – Job importance dictates position in ready Q relative to other ready jobs  
 – Job moved from running to blocked state when waiting on peripheral  
     – then returned to ready Q  
 (1 per –, max 6) [6]

9 (a) (i) 10010100 (1 per nibble) [2]

(ii) 136 (1 for 1, 1 for 36) [2]

(iii) 5E (1 per digit) [2]

(b) (i) 
$$\begin{array}{r} 10111101 \\ 1\ 1111 \\ \hline \end{array}$$
 (1 for answer/1 for carries) [2]

(ii) Negative result when originals all positive/carrying in to MSB but not out/overflow. [1]

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**10** Hardware:

- Connections to ensure possible to pass signals from one device to another
- Common communication medium when passing signals
- Compatibility of peripherals with computers

## Files:

- File formats must match each other...
- text only/rich text/others if explained
- Protocol necessary to ensure transmitted file received properly

## Other parts of protocol must be agreed:

- Match baud rate
- Type of communication/simplex...serial, ...
- Mention of common protocol.

## Other points:

- Standardisation reduces costs
- Standardisation makes solutions easier to find.

(1 per –, max 6)

[6]