

## **MARK SCHEME for the May/June 2007 question paper**

### **9691 COMPUTING**

**9691/03**

Paper 3 (Written Paper 3), maximum raw mark 90

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.

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- 1 (a) (i) - OS controls the hardware in such a way that
- the individual does not know that they are using a network
  - OS hides the communication necessary.
- (ii) - Storage space partitioned into many logical areas
- Storage is allocated to users of the network (by system manager)
  - OS allows normal file manipulation of a stand alone/examples (search,delete...)
  - Some file areas may be shared
- (iii) - Different user types given different rights
- R/O, other protections on files/data
  - Passwords and ID to establish identity
- (1 per -, max 2 per dotted, max 6) [6]

- (b) - HCI
- Type/to allow communication
  - Utility programs
    - Routines that the OS makes available to the user/example
  - Hardware control/Input and Output
    - Software routines to control the hardware/device drivers
  - Multi tasking capability
    - allows different Windows/user can carry on more than one task at a time
  - Spooling
    - to queue jobs for input/printing/..
  - Security
    - to ensure that different users can keep files confidential
  - Host software
    - scheduler to schedule instructions
  - Memory management
    - to allocate memory to data/software
  - Interrupt handling
    - to schedule jobs through the system
  - Translators
    - to produce object code
- (1 per -, max 2 pairs, max 4) [4]

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- 2 - Much of the work will involve text files produced by the students
- speed of processors not important
  - Storage of work may be:
    - central on a shared large volume hard drive
    - or on individual memory sticks requiring USB ports (accept floppy drives)
  - Video of drama productions of literary works
    - video/graphics cards
    - requires large volume storage
    - allow for editing
    - requiring high speed processors
    - star/high speed network requirements (optic fibre)
  - Printers need only be monochrome because of type of work to be output
    - Unless media studies is mentioned needing high quality colour printing
  - Credit for extra storage device, with reason
    - CDRW to back up students' work from hard drive.
  - Credit for mention of need for system to be compatible with others in school.
  - DVD drive to play audio/video disks
  - Microphones/speakers/headphones for language work
  - Network hardware
    - to produce a learning environment across the classroom/school
  - Use of Internet
    - hardware necessary to log on.
- (1 per -, max 7) [7]
- 3 (a) - Array may become full because of a lot of print jobs being sent together/end of lesson
- Linked list does not needlessly take up space in memory
  - Print jobs may be inserted into queue if they have a high priority.
- (1 per -, max 2) [2]
- (b) In any form (can alter depending on which end of list is front of queue)
- Find print Q in head of list table
- (i) - Insert data into free space
- H of L points to new node
  - new node points to old first value
  - mention of insertion of high priority jobs into queue
- (ii) - Check to ensure list not empty
- follow pointers to null pointer
  - read address of print job
  - move null pointer to previous node
  - return node to free space
- (1 per -, max 3 per dotted, max 5) [5]

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- 4** Data:
- Personal contact details
  - Financial details/credit card numbers/account numbers
- Problems:
- Details of cards not typed in/communicated accurately
  - Hackers attacking communications
  - Hackers attacking customer/order database
  - Workers misusing data
  - Data being distributed, leading to unsolicited communications
  - Some potential customers could be put off by worries about use of data
- Solutions:
- Use a firewall
  - Use packet switching not circuit switching
  - Validation of data input e.g. check digit
  - Verification of communication e.g. Parity
  - Encoding data/encryption
  - Digital signatures
  - Passwords to enter database
  - Workers subject to data protection legislation/confidentiality contracts.
  - Company publishes code of conduct to increase confidence of users.
  - Workers not allowed portable storage devices.
- (1 per -, max 8) [8]
- 5 (a)** e.g. Automatic stock control system (accept any sensible application where data is valuable) [1]
- (b)** - Accuracy
- Less chance of error/less chance of missing something
  - Up to date
    - can be kept permanently up to date
  - VANS
    - arranges for transfer of data from one place to where it is needed
  - Data mining
    - the ability to trawl large quantities of data to find relevant information
  - Security
    - suitable expansion
- (1 per -, max 3 pairs, max 6) [6]

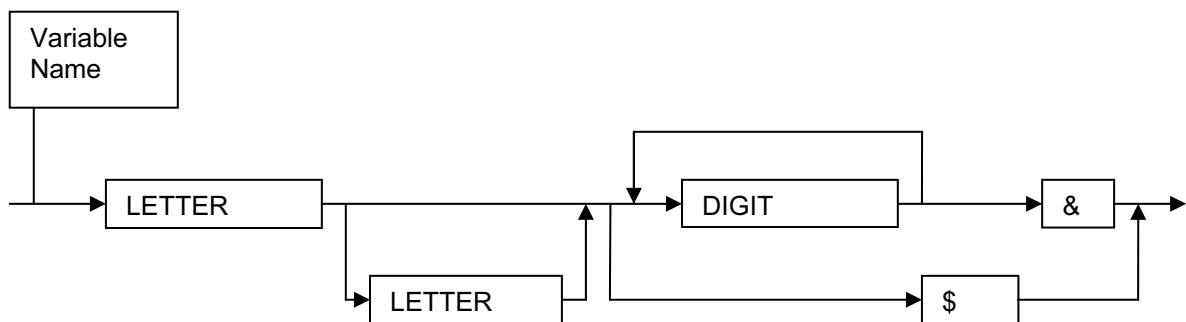
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- 6 (a) (i)** - The value to be searched for is passed/in this case the actual name “SMITH” is passed
- (ii)** - The address of the value is passed/The location of the name is passed (allowing it to be altered if necessary). [2]
- (b) (i)** - The value of the variable only exists in the procedure  
- The counter used to control the loop (so that it does not effect a repeat use of the variable).
- (ii)** - the value of the variable exists throughout the code of the program  
- the variable used to hold the details searched for (needs to be used outside the procedure).  
(Note: Other examples are fine with reasonable explanation. 1 per -, max 4) [4]
- (c)** - Interpreter translates one command at a time and runs it before the next is translated.  
- Used during writing because it aids debugging  
- (Compiler translates whole program) into object code (before running)  
- Runs faster once it has been called/may be held as a library routine.  
(1 per -, max 4) [4]
- (d)** - Decides where to place programs and procedures  
- Loads program and procedures into memory  
- Adjusts memory addresses to match locations used  
(1 per -, max 2) [2]
- 7 (a)** - Instructions and data stored together in same memory  
- Single processor used  
- Uses serial processing of instructions  
(1 per -, max 2) [2]
- (b) (i)** - many processors are used...  
- simultaneously  
- all doing some processing required by the application  
- Special non-linear programs must be produced  
(1 per -, max 2) [2]
- (ii)** - A suitable example e.g. .Weather forecasting.  
- Large amount of processing required, the results of which are time sensitive  
(1 for application, 1 for reason) [2]

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- 8 (a) - Production of a test prototype would be very expensive  
 - Time taken to produce and test a prototype may be too long/immediate need  
 - Need to test in circumstances unable to be reproduced  
 - May be too dangerous to test in reality  
 - Situations can be reproduced which may never arise in ordinary testing  
 (1 per -, max 3) [3]
- (b) - No positive reasons of time/danger  
 - Impossible to simulate a physical action like cutting grass  
 - Lawn mower can be produced easily  
 - large quantity will be sold so prototype costs easily covered  
 (1 per -, max 2) [2]
- 9 (a) - Range is decreased...  
 - because power of two which the mantissa is multiplying by is decreased.  
 - Accuracy is increased...  
 - because more digits are represented after the binary point. [4]
- (b)  $\frac{1}{2} \times 2^0$  (2 marks or 1 for each part)  
 $\frac{1}{2}$  or .5 (2 marks) [2]
- (c) - A normalised value must have the first two bits of the mantissa different  
 - Therefore one must be a 1  
 - which must represent either -1 or  $+\frac{1}{2}$ , but not zero.  
 (1 per -, max 2) [2]

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Mark Points:

- Recognisable syntax diagram showing sequence
- Single letter possible
- Two letters, without more, possible
- Single digit possible
- Loop for multiple digits...
- **inside** \$ loop
- Dollar loop correctly positioned to miss Digits and &
- & after digits loop
- (1 per -, max 6)

[6]

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**11 (a)** External level gives the different views of the data seen by each of the users.  
 Conceptual level is an integration of all the user views of the data/abstract representation of the whole database/relationship between tables  
 Internal level is the structure used for storage of the data/the logical arrangements of the data for storage. [3]

- (b) (i)** - Used to define the data tables  
 - Specifies data types/structures  
 - Specifies constraints on the data

**(ii)** Allows the user to:

- Insert
- Update
- Delete
- Modify/edit
- Retrieve data

(1 per -, max 2 per dotted, max 4)

[4]

**12** - All staff will need training relevant to their work  
 - Many staff will find the new systems difficult to learn  
 - Type of training important:  
 - Course type with trainer  
   - restricts learning times/can be intimidating/difficult to satisfy all demands/gives human contact for help  
 - Electronic/Software based  
   - Training on system at time user is free/individual training takes away intimidation/allows for practice/repetition/may not have access to equipment/has to be done in own time  
 - Age problem of trainees/young have preconceptions, old have worries of ability  
 - Customers have problem with new systems/must learn new procedures  
 - Change of enquiries/ordering procedures to on-line  
 - Necessary regular upgrades of software and hardware cause repeats of problems as training needs to be repeated.  
 - Computer based system implies training should be on computer  
 - Reluctance on the part of staff to learn/use new methods  
 (1 per -, max 7) [7]