General Certificate of Education
Advanced Level

Confidential

9691/03, 5218/01
COMPUTING

May/June 2007

Maximum Mark: 90

Mark Scheme

Important Notice
Mark schemes have been issued on the basis of **one** copy per Assistant Examiner and **two** copies per Team Leader.

UNIVERSITY *of* CAMBRIDGE
International Examinations

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
- 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 dotty, 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

(1 per -, max 2 pairs, max 4) [4]

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
- requiring high speed processors
- star/high speed network requirements (optic fibre) – requires large volume storage.
- 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.

(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)
- 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 dotty, max 5) [5]

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:
- Validation of data input e.g. check digit
- Verification of communication e.g. Parity
- Encoding data
- 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

(1 per -, max 3 pairs, max 6) [6]

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 from which are time sensitive
(1 for application, 1 for reason) [2]

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]

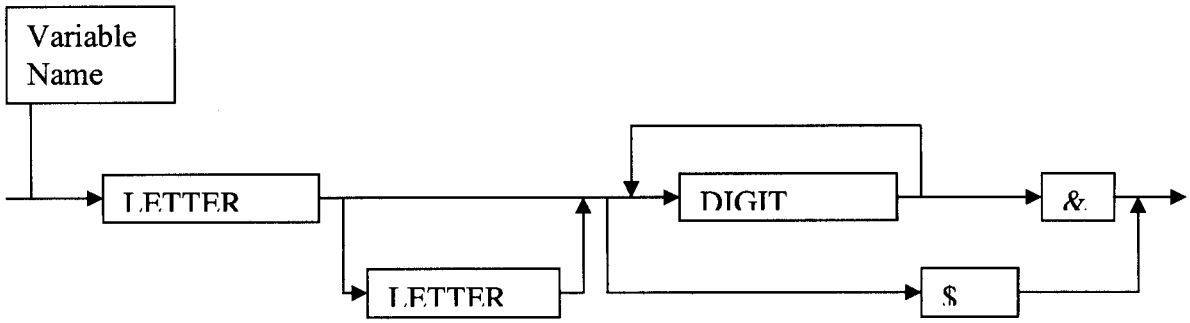
b - No positive reasons of time/danger
- Impossible to simulate a physical action like cutting grass
- Lawn mower can be produced easily
- large quantity will be sold so prototype costs easily covered
(1 per -, max 2) [2]

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
½ x 2^0 (2 marks or 1 for each part)
½ 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 + ½ , but not zero.
(1 per -, max 2) [2]

10



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]

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.
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 and structures
- Specifies constraints on the data

(ii) - Allows the user to
- Insert
- Update
- Delete
- Modify
- Retrieve
data
(1 per -, max 2 per dotty, 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
- Electronic/Software based
    - Training on system at time user is free/individual training takes away intimidation/allows for practice/repetition
- 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.

(1 per -, max 7) [7]