MARK SCHEME for the May/June 2007 question paper

9691 COMPUTING

9691/03   Paper 3 (Written Paper 3), maximum raw mark 90

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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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 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
- 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]

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 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:
- 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]

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]

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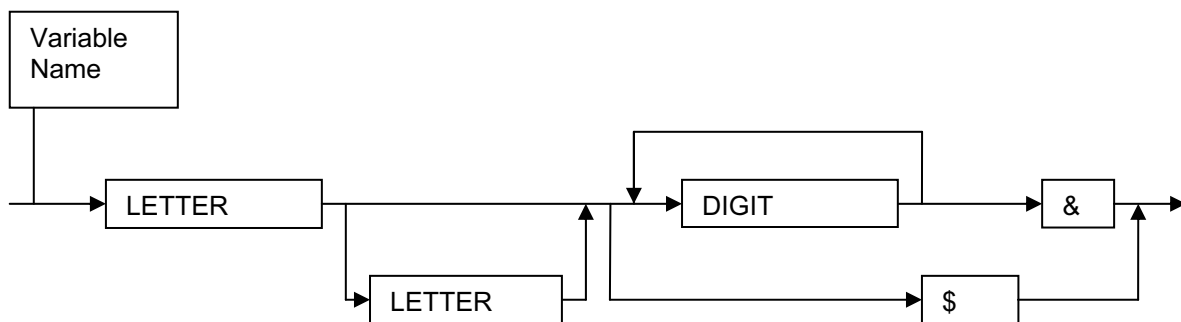
Mark Points:
- Recognisable syntax diagram showing sequence
- Single letter possible
- Two letters, without more, possible
- Single digit possible
- Loop for multiple digits…
- **inside** $ loop
- Dollar loop correctly positioned to miss Digits and &
- & after digits loop
  (1 per -, max 6)   [6]

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/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 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/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]