General Certificate of Education
Advanced Level

Mark Scheme

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

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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
            - 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"
              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]
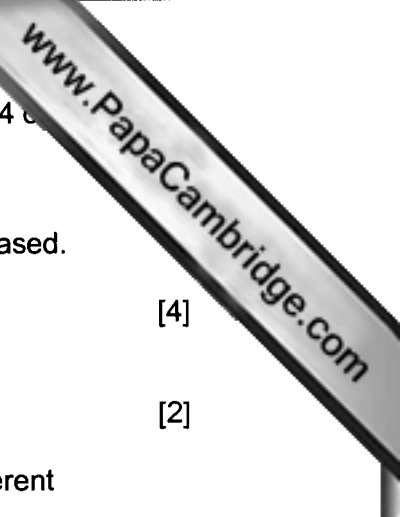
9   a   - Range is decreased…
- because power of two which the mantissa is multiplying by is decreased.
- Accuracy is increased…
- because more digits are represented after the binary point.   [4]

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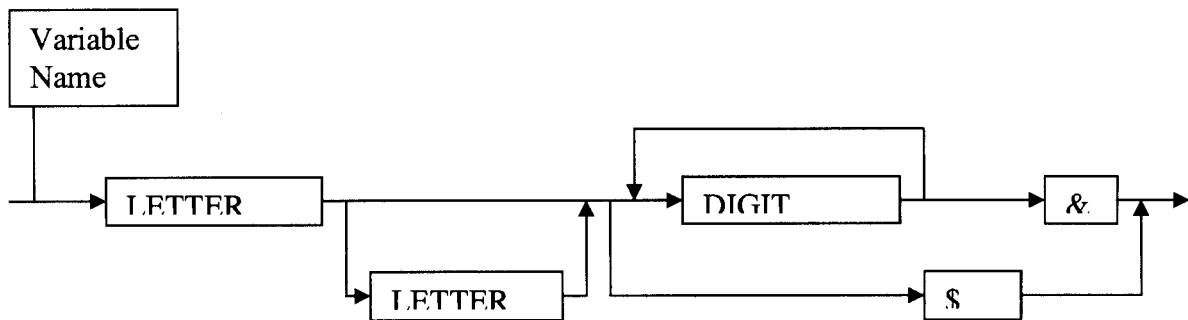
Mark Points:
- Recognisable syntax diagram showing sequence
- Single letter possible
- Two letters, without more, possible
- Single digit possible
- Loop for multiple digits…
- **inside** $ loop
- Dollar loop correctly positioned to miss Digits and &
- & after digits loop
(1 per -, max 6)   [6]

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]