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.

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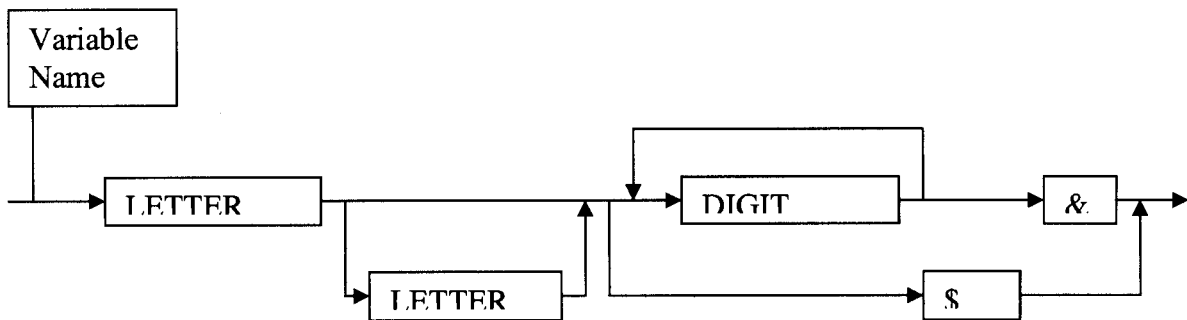
Mark Points:
- Recognisable syntax diagram showing sequence
- Single letter possible
- Two letters, without more, possible
- Single digit possible
- Loop for multiple digits…
- **inside** $ loop
- Dollar loop correctly positioned to miss Digits and &
- & after digits loop
(1 per -, max 6)   [6]

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]