

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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- 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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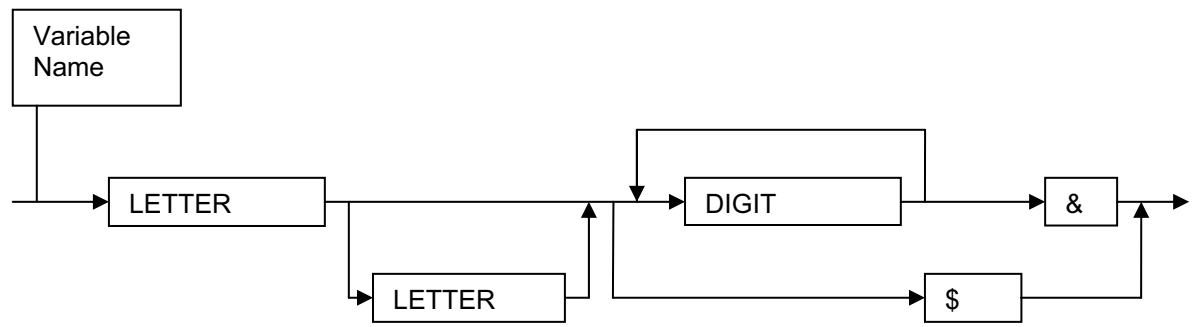
- 6 (a) (i) - The value to be searched for is passed/in this case the actual name "SMITH" is passed [2]
- (ii) - The address of the value is passed/The location of the name is passed (allowing it to be altered if necessary). [2]
- (b) (i) - The value of the variable only exists in the procedure
- The 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]

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]

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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]