UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Advanced Level

MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

9691 COMPUTING

9691/31 Paper 31 (Written), maximum raw mark 90

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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1 **(a)** Any sensible organisation e.g. supermarket.

(b) e.g. for a supermarket:
-Customer names and addresses from deliveries
-valuable to advertisers/gives a breakdown of who the typical shopper is from their neighborhood
-Amounts of goods sold in period of time
-allows comparison between brands to ensure popular brand stocked/ to act as bargaining tool when setting costs of goods
-Bank account details/credit card details linked to addresses
-Mail order companies to know who to send expensive offers to
-Goods bought by individual shoppers
-to sell to mail order companies/aimed mailshots
-Sales over different parts of the store
-to help with designing layout to maximise profits
-Individuals who respond to mailshots/offers
-target offers at responsive customers.

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

2 **(a)** -Intranet is a closed/private network rather than open/public network
-More secure because access controlled by bank…
-by use of IDs and passwords
-level of access
-cuts down on time wasted on junk mail/unsuitable material.
-All important because the information is very sensitive.
(1 per -, max 4) [4]

(b) Problems:
-Hackers attack communications
-Hackers attack customer data
-Data being distributed leading to unsolicited communications
Measures:
-Encrypting data
-Digital signatures to guarantee reliability of source
-Passwords to enter user's area/database
-Use of firewall to block unwanted access
-Workers subject to D.P. legislation
-Portable storage devices not allowed.
(1 per -, max 2 for concerns, max 4 for solutions, max 5) [5]

3 **(a)** Marks points:
-Address in instruction is decoded
-Contents of that memory location contain an address
-The address of the data to be used. [3]

(b) -Some areas of memory cannot be addressed because size of memory address > space available in instruction
-Memory address will fit in a memory location [2]

4 **(a)** -Terminal (with small amount of processing power)
-Normal peripherals of mouse/key board/screen/printer
-Storage in form of hard drive (to store confidential documents)
-Storage in form of flash memory/cartridge… (to allow portability of data)
(1 per -, max 3) [3]

(b) -Cable
-fixes position of machine
-secure
-Wireless
-can move machine and yet remain in contact
-insecure, subject to hacking/eavesdropping.
-coax cable
-cheap to install for school
-fibre-optic connection
-more secure/faster transmission of data
(1 for two methods; 1 each for comparisons; 1 for general point. Max 3) [3]

(c) **(i)** -Individual who can be covered for time off/Whole group who could be trained en masse if school admin did not function
-Learning about system requirements/learning about the use of the software
-Comparison between technical and user requirements
(1 per -, max 2) [2]

(ii) -Can be done in own time
-At own pace
-No personality clashes with tutor
-Can learn on actual software to be used
-Done without affecting running of school/no down time
-Electronic, so progress can be automatically monitored.
(1 per -, max 4) [4]

(d) **(i)** Advantage: Searching is quicker because a binary search can be used.
Disadvantage: When index needs changing many of the contents must be moved. [2]

(ii) -Insert details in file
-Insert index entry in one of free space list
-Start from head of list pointer
Repeat
-If points to value > new student
-Then alter pointers to insert new value here in list. End
-Else follow pointer to new value to compare
-Until no more values in list
-Insert new value and move null pointer. End
(1 per -, max 6) [6]

5 -Address of instruction copies from PC to MAR
-PC incremented
-Instruction at address stored in MAR copied to MDR/MBR
-Instruction copied from MDR/MBR to CIR
-Instruction code in CIR is decoded
-Address in CIR copied to MAR
-Because Jump instruction, address in MAR copied to PC
(1 per -, max 6) [6]

6 Lexical:
-Instructions are tokenised
-Some of characters must be combined to create token for keyword
-If keyword does not exist in internal dictionary of keywords
-check for valid variable name
-against rules stated in BNF
-Error is reported
Syntax:
-Each keyword has an associated syntax
-Tokens are checked to ensure that they match the syntax for that keyword.
- e.g. Do left and right brackets match?/Does punctuation for Print keyword match rules?/…
-error is reported (only credit once)
(1 per -, max 5) [5]

7 **(a)** **(i)** An application where the output is produced quickly enough to affect the next input. [1]

(ii) -Any sensible example e.g. Check a PIN at an ATM machine
-must be done before offering a service on the card proffered. [2]

(b) -Touch sensor to ensure that window is not opened
-Pressure sensor/pad by door to sense someone stepping on it
-Infra-red sensor to pick up body heat of someone in room
-Sound sensor to hear broken glass if window broken
-Light sensor to detect when a light beam is broken
(2 per -, 1 for sensor + 1 for use. N.B. uses are examples, max 3 sensors) [6]

8 **(a)** **(i)** -A table holding information about the database
-Used by managers of the database, not users
-Maps logical database to physical storage
-Allows existence check on data to be carried out.
(1 per -, max 2) [2]

(ii) -The language used to allow the manager to write the…
-description of the data items to be stored in the database [2]
-defines the structure of the tables.

(iii) -Language used allow user to access data…
-store data…
-change data in a database
-search for data in the database.
(1 per -, max 2) [2]

(b) (i) -Most items of data only need to be stored once…
-because tables are linked allowing the contents of all tables to be used via access to one. [2]

(ii) -Access to areas of data can be easily controlled because…
-users each have their own view of data
-DBMS can control views using access rights.
-Regular back ups of the data can be made…
-automatically by the DBMS to alternative hardware.
(1 per -, max 2) [2]

(iii) -less chance of contradictions being caused
-as most information is only stored once.
-data protected from misguided or malicious processing/alteration
-leading user to trust in the correctness of the data
(1 per -, max 2) [2]

9 (a) (i) Only one user has access at a time. [1]

(ii) -Application Programming Interface
-provides platform to run software
-file management
-manipulation of files
-memory management
-paging/virtual memory/scheduling
-processor management
-interrupt handling/scheduling
-I/O management / handles data transfers
-between areas of processor/between primary memory and secondary storage.
-device drivers / handles data between processor and I/O peripherals
-using instructions in device drivers and control of buffers
- user interface
-a method of communicating with computer/suitable example
-Utility software
-offers series of software to carry out housekeeping/monitor and maintain and use the hardware.
-Security/privacy
-will protect data by copying to other media automatically/sets up passwords to restrict access to files.
(1 per -, max 2 components, max 4) [4]

(b) (i) -O.S. hides the complexities of the system from users.
-User believes that their computer is a stand-alone.
-User is unaware of sharing resources.
(1 per -, max 2) [2]

(ii) -Sets up files and directories for user.
-Allows group access to some files.
-Access to files dictated by user I.D.
(1 per -, max 2) [2]

10 **(i)** -Information must be collected before anything else is done.
-Documentation is done alongside all other tasks
-Information must be analysed before solution attempted.
-Data files can be created alongside problem solution.
-Design must be completed before software can be written.
-Design and software can be done alongside data files.
-Testing must be documented.
-Project must be finished before implementation.
(1 per -, max 6) [6]

(ii) -Critical Path: AGH or ABDFH. [1]

(iii) -Least Time: 29 days. [1]