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

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UNIVERSITY of CAMBRIDGE
International Examinations

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]