RECOGNISING ACHIEVEMENT

GCE

Computing

Advanced GCE **A2 7820**

Advanced Subsidiary GCE **AS 3820**

Combined Mark Schemes And Report on the Units

January 2006

3820/7820/MS/R/06J

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CONTENTS

Advanced GCE Computing (7820)

Advanced Subsidiary GCE Computing (3820)

MARK SCHEMES FOR THE UNITS

REPORT ON THE UNITS

Mark Scheme 2506
January 2006

1 **(a)** (A piece of hardware which can be used to) input data to the CPU **[1]**
(A piece of hardware which can be used to) output information from the CPU **[1]**

(b) -(Not 'OMR' Scanner)
-Bar code reader/light wand/scanner/to read the bar code on an item
-Digital scales/to input weight of produce being purchased
-Keyboard/to input damaged bar code/input amount paid
-LCD/to show details and price of current item
-Printer/to give hard copy output for customer to keep
-Beeper/to signify that the barcode has been properly read.
-Card reader/chip and pin to input payment details
(2 per -, max 1 input and 1 output, max 4) **[4]**

2 **(a)** Advantages:
-Sharing of hardware/internet connection
-Sharing of software
-Sharing of data files
-Can use any machine
-Teacher can see what is being done on any machine
-Communication
-Maintenance can be simplified (NOT: updating unless specify hardware)
Disadvantages:
-Security of files is worse than on stand-alone/virus infections more virulent
-Bottlenecks in the use of the hardware
-Fault in hardware may cause problems throughout network.
(1 per -, max 3 for advantages, 1 for disadvantage, max 4) **[4]**

(b) Bus:
-All computers/terminals linked to central bus (Not daisy chained)
-Limited number of peripherals shown
-Terminators on ends of bus
(1 per -, max 2)
Advantage:
Wiring is simplified/simple to set up.
Computers can be added simply. **[3]**

Star:
-Each machine has a direct connection with a central point
-Hub/server/(Not computer if it is the only one labelled)
-limited number of peripherals shown
(1 per -, max 2)
Advantage:
If one machine fails it does not affect the remainder.
(Do not allow 'node' or 'client' rather than 'computer') **[3]**

3 **(a)** **(i)** The instructions in a form that the computer can use/machine code/binary/executable form **[1]**

(ii) The program written by the programmer/in a HLL (or higher level than machine code) (NOT: The high level language itself) **[1]**

(b) -The computer cannot process the instructions
-The computer needs the instructions in binary form/object/machine code (which the programmer cannot understand)
-The translator creates the binary form from the HLL form.
(1 per -, max 2) **[2]**

(c) **(i)** -Does not follow the rules of the language/Grammar error/Accept spelling error, bit only if specify ‘to a key word’
-e.g. PLINT instead of PRINT **[2]**
-An error in the design of the code/does not follow the algorithm
(Not just ‘logically incorrect’)
-e.g. A jump to the wrong statement **[2]**

4 **(a)** **(i)** -Inputs are processed quickly enough to affect next output/inputs processed straight away
-Player needs to see results of decisions made in order to make next decision **[2]**

(ii) -Peripheral being used by the player is linked directly to the processor
-If decisions cannot be immediately sent to processor the output cannot be affected. **[2]**

(b) **(i)** -Data collected in batches
-for later input
-when processor idle
-no human intervention necessary
-jobs normally involve large amount of data
-which needs similar processing/data is similar in nature
-and is not time sensitive
(1 per -, max 4) **[4]**

(ii) -Utility bills/payroll/… (must CLEARLY be batch processing example)
-Because large amount of data (or other valid reason) **[2]**

5 **(a)** **(i)** String/text/character 10-30
Integer/date 1/2/4/6/8
Time/integer/real 2-5
Boolean ('Yes/No') 1
(1 for each data type, 1 for all field sizes, max 5) **[5]**

(ii) Calculation: -Multiply their total by 1000
-Divide by 1024
-Add 10%
-Answer between 15.3 Kb and 48.4 Kb
(1 per -, max 3) **[3]**

(b) Floppy disk/memory stick/USB memory/tape
Because the size of the file is small/the medium is universally available/portable
(Give marks for alternative if sensible reason is given. Do not credit CDROM or DVD or CD or CDR)
(Reason dependent on first mark being given) **[2]**

6 **(a)** **(i)** -The splitting up of a (large) task into smaller parts
-and repeatedly smaller
-until each part is easily solvable
(1 per -, max 2) **[2]**

(ii) A piece of code/subprogram used to solve a specific problem **[1]**

(iii) -Each **small** part of the design can be solved with a procedure
-The procedures are easily testable
-Each procedure can be used a number of times
-Different programmers can be used
(1 per -, max 2) **[2]**

(b) -Use of comments as part of the code
-which the computer ignores
-to explain what the rest of the code does
-Meaningful names for variables and procedures
-to describe the values held
-so that it is unnecessary to keep referring to look up tables
-Indentation of lines of code
-so that instructions that go together can be easily spotted
-e.g. procedures, loops…
-Modularity
-dividing the code into smaller chunks
-so that the logic is easy to understand.
(1 per -, max 2 per method, max 2 methods, max 4) **[4]**

7 **(a)** **(i)** 10101011 (1 per nibble) **[2]**
(ii) 01010110 (1 per nibble) **[2]**

(b) **(i)** -54 (1 for – sign, 1 for 54) **[2]**
(ii) -74(1 for – sign, 1 for 74) **[2]**

8 **(i)**
-Used to reduce the size of files….
-but maintain the content
-(particularly when storing files) if the size of the storage medium is critical
-or in the communication of data from one place to another to speed up transmission
-Must be used in reverse when file is to be accessed in order to make it readable again
(1 per -, max 3 **[3]**

(ii)
-Used to move files in and out of memory/storage
-Used to index files and keep a record of where they are
-Used to sort and order files
-Used to search for files
-Used to amend/delete files
-Used to rename files
-copying of files
(1 per -, max 3) **[3]**

(iii)
-Used to check that data has not been corrupted after data transfer
-from one part of the system to another.
-Typical method is echoing back
-or parity check.
-(Often error checking software) will automatically correct errors.
(1 per -, max 3) **[3]**

9 **(i)**
-Manages execution of instructions
-manages the memory of the processor
-Provides timing to synchronise processor/via clock
(1 per -, max 2) **[2]**

(ii)
-Stores (parts of) operating system (currently in use).
-Stores (parts of) application software (currently in use).
-Stores data currently in use.
(1 per -, max 2) **[2]**

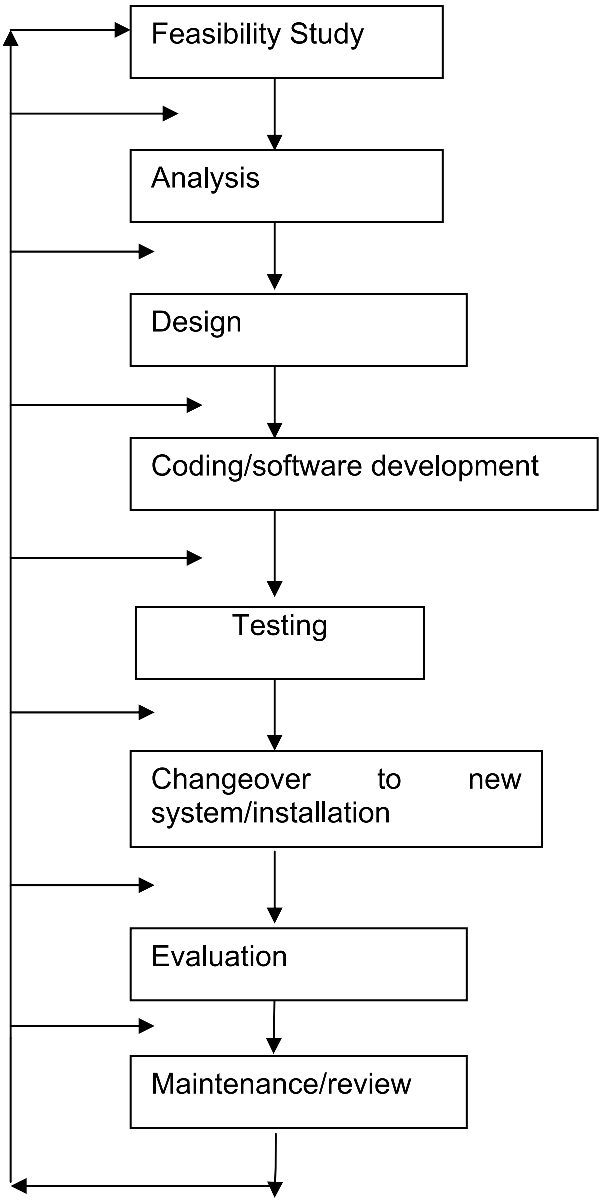
(iii)
-Carries out all arithmetic functions
-Determines the result of logic functions
-All input and output goes via ALU
(1 per -, max 2) **[2]**

10 **(a)** -Name of array
-Data type to be held
-Dimension of array
-maximum number of items to be held
(1 per -, max3) **[3]**

(b) Credit answer in whatever form the candidate has chosen to use.
Mark points:
-Determine maximum size of array
-Make counter equal to 0 or 1/End of array
-Determine whether Array(counter) = item
-If item found then report success and counter/location in array
-If not found then
    -Increment counter/decrement counter
    -If counter <= maximum value then/If counter >0 then
        -repeat from point 3
        -else report not found.
(1 per -, max 7) **[7]**

Mark Scheme 2508
January 2006

1 (a)



1 mark for each stage up to max of 6
1 mark for idea of feedback
Allow 1 mark for order
Accept alternative names for above stages

Max of 7 **[7]**

(b) **Direct changeover/immediate changeover/big bang (1)**
Old system stops and the new system begins (1)
no overlap between systems (1)
no part changeover (1)
If new system fails old system cannot be used (1)
Installed at a quiet time, such as weekend or overnight
1 mark for method
Max of 2 marks for description

Parallel changeover (1)
Two systems run side by side for a period of time (1)
Comparing results of two systems can happen (1)
If new system fails, old system can be used (1)
1 mark for method
Max of 2 marks for description

Pilot changeover (1)
New system could be used for part of the warehouse initially (1)
To allow for testing of the system (1)
Roll out the new system if successful (1)/abandon the new system (1)
1 mark for method
Max of 2 marks for description

Phased changeover (1)
Introduce part of the new system (1)/into one area of the process (1)
If successful, introduce another area (1)/ otherwise abandon new system (1)
1 mark for method
Max of 2 marks for description

Any three, (max 9 marks) methods identified and described
Max 3 marks each method of description. **[9]**

(c) Technical Documentation
Installation of software (1)
Hardware specification (1)
Data/file structures (1)
Program listings (1)
Data Dictionary (1)
Description of each program (1)
Structured diagrams including algorithms (1)
Testing strategy with evidence of results (1)
Description of data flow (1) **[4]**

(d) Suitability (1)
Does the system really provide a solution to the problem? (1)
Does the system meet the user requirements? (1)
Does the new software integrate with the existing software? (1)

Effectiveness (1)
Does the system do what it is suppose to do? (1)
Does the system suffer from bugs? (1)
Are the access times for data retrieval acceptable? (1)
Is the hardware/software reliable? (1)

Usability (1)
Do the users find it easy to use the system? (1)
Do the users require continuous training? (1)
Is the on-line help/tutorials useful? (1)
Do they have quick access to information? (1)
Do users save time not having to carry out tedious/repetitive tasks? (1)

Maintainability (1)
Will it be easy to maintain? (1)
Any shortcomings to be modified? (1)
Adding new modules? (1)
On-line upgrades? (1)

Security of data (1)
Is the data secure against unauthorised access? (1)
Are the data/ software backups taking place? (1)
Are users coping with passwords/user ids? (1)

Max of 2 for each of three factors **[6]**

2 **Icon**

Small graphical image (1)
To allow easy recognition (of applications) (1)
Can be pointed and clicked on (1)
Used as a short cut for the user/no need to type in commands (1) **[2]**

Menu

Pop-up/pull down (1)
To select features/options (1)
From a predefined list of options (1)
Used as an alternative to hot keys (1) **[2]**

Window

Screen is organised as a series of windows/overlapping frames (1)
That can be viewed singularly or in combinations (1)
Windows can be minimised/maximised/resized/moved (1)
Allows for multi-tasking (1) **[2]**

Toolbar

Combination of buttons (1)
Each button has an icon/letter (1)
Depicting an option (1)
Situated on the screen, the top, bottom, side or floating option (1)
Used in conjunction with a mouse (1) **[2]**

Dialogue box

To allow the user and the computer to interact (1) in a controlled manner (1)
To allow the computer to control what the user is doing (1)
By offering a limited number of choices (1)
Such as yes/no/cancel (1)
with one choice normally set as a default value (1) **[2]**

3 **Bar Code**
Characters are coded as a series of light and dark vertical bars of varying width (1)
The bar code can be read by the hand-held scanner or the laser scanner (1)
The bar code reader uses laser beam light to enter the code automatically (1)
Use -Any application that identifies items (1) such as:
produce itemised bills/collect data at POS terminal in shops or to track parcels in the post office or to track luggage in airports or to issue books in libraries

2 marks for 2 valid points and 1 mark for suitable use [3]

Optical Character Recognition
Enables the computer to identify by reflecting light onto written or printed characters (1)
Special recognition software is then used to turn each character into an ASCII value (1) which can then be edited using a word-processing package (1)
The pattern of each character scanned is compared with already stored characters looking for a match (1)
Different font types and sizes are capable of recognition (1)
Use – Turnaround document in billing, scanning a hard copy into a word-processing (1) or reading documents for the blind (1)

2 marks for 2 valid points and 1 mark for suitable use [3]

Sensor
Electronic component (1)
Responds to a physical property such as temperature (1)
Converts energy from one form to another (1)
Data logging (1)
Use-measuring temperature (1), measuring humidity (1), magnetic tilt switches to sense movement (1)

2 marks for 2 valid points and 1 mark for suitable use [3]

4 **(a)** All data to be input is collected together (1)
Over a period of time (1)
Before being processed (1)
Processed as a single operation (1) **[2]**

(b) Telephone usage readings would be collected over a month (1)/similar data is collected (1)

Processed at a convenient time (1)
normally at a quiet time such as middle of night/weekend (1)
computer could be used for customer queries at other times (1)
Results are not needed immediately (1)
No need for human interaction (1),
Processing is simple (1)
All the processing is the same for each bill (1)
Large amount of time required for peripheral devices (1) **[4]**

(c) Range check (1)
Check lower (1) and upper limits of customer account number. (1)

Check digit (1)
Includes an extra digit to the customer account number (1)
Calculated from account number (1)

Existence check (1)
To check that a customer account number appears/exists (1) in the computer system. (1)

Format/Character check (1)
To check all characters are of the correct type (1)/digits (1)

Field length check (1)
The number of characters entered (1) is 8 (1) **[6]**

5 **The Individual**

Can combine work and family commitments (1)
No necessity to live within travelling distance of work (1)
Flexible working hours (1)
Feeling of isolation (1)
Difficult to allocate a room in the house as an office (1)
Can save on commuting costs/business clothes (1)
Distraction factor (1)

The Organisation

No need to rent expensive offices in cities (1)
Saving money on heating/electricity (1)
Greater reliance on technology (1)
More opportunities to employ disabled people (1)
More difficult to monitor the workforce (1)
No concept of teamwork/no face to face meetings (1)
Can attract a workforce from all over the world (1)
The set up costs for WAN can be expensive (1)

Society in general

Equal opportunities for parents (1)
Improved family life as parent(s) is at home (1)
Reduced traffic congestion as fewer cars on the road (1)
Less pollution due to fewer cars on road – more environment friendly (1)
Prosperity is spread across the country rather than concentrated in commuter belts in cities (1)
Lack of social interaction between people (1)

Any nine points 1 mark each, max of 4 points allowed in any one area.
Allow one mark for conclusion. **[9]**

6 **(a)** Cost effective/cheaper due to shared development costs (1)
References from existing users (1)
Tried and tested thoroughly (1)
Ready to install/use/available (1)
Documentation readily available/ third party manuals (1)
Third party training available/support available (1)
Compatibility with other systems (1)
Dedicated help lines (1) **[4]**

(b) Software specially written for a particular user/organisation/Tailor made software (1)
meeting their exact requirements (1)
written inhouse/outsourcing (1) **[2]**

7 **(a)** An application of artificial intelligence (1)
To a particular area (1)
Where human expert knowledge and experiences (1)
Are made available through a computer package/software (1)
It provides a user interface for doctors to input patient medical problems (1)
An inference engine to search the knowledge base (1)
A knowledge base containing facts/rules. (1) **[3]**

(b) Ability to diagnose an illness (1)
Suggest a recommended solution (1)
Can combine the knowledge of many human experts (1)
Ability to retain the information (1)
Much faster than a human at diagnosis (1)
Low error rate (1)
Advice and recommendations are consistent (1) **[3]**

(c) Form driven interface
Data has to be entered in a predetermined way (1)
Data is validated (1)
Forms guide the user via data boxes (1)
Telling the user is exactly what has to be entered (1)
Examples of data to be entered can assist the user (1)
Use of buttons (1)
Drop down/pick lists of choices (1)
Checkboxes to enter data (1)
Text boxes (1)
Uses dialogue boxes to interact with the user (1)
Some data boxes maybe optional/some way require data before processing (1)
Forms can be designed as formatted to allow fewer ways for the user to enter data (1)
Forms can be designed in free format offering more flexibility for the user when entering data (1)
[6]

(d) Different kinds of voices (male/female) need to be understood (1)
Different kinds of accents need to be understood (1)
Background noise may interfere with the input (1)
Complex speech recognition software is required to understand different human voices (1)
The time taken to train the system (1)
[2]

Total [86 + 4] = 90

Mark Scheme 2509
January 2006

Each bullet point is worth **one** mark, up to the maximum for that section, unless stated otherwise.

1 (a) (i) Description:

- round robin
- each user allocated a time slice in turn

or

- system of priorities
- highest priority first

Purpose:

- to make efficient use of processor time
- to make efficient use of resources
- to provide no apparent delay for user
- to maximise throughput

[max 4]

(ii)

- splitting a (large) program into smaller sections
- only part of program needs to be in memory
- some of program can stay on disk
- allows program to run when there is insufficient memory
- virtual memory
- splitting memory into smaller sections
- both need indexing
- sections of program need not be all together

[max 2]

(iii)

- segments may be variable size, pages are fixed size
- pages are smaller

[max 1]

(b) (i)

- a map of where files are stored in backing store (sectors, grouped in clusters)
- provides addresses/pointers to start of files
- holds file names
- holds file sizes
- identifies free space
- stores access rights
- is updated by operating system/is used when files are saved or deleted

[max 4]

(ii)

- used to start the system
- load operating system
- allows access to personal settings
- checks status of hardware

[max 2]

2 **(a)**
- interpreter stops at first error
- an error message is produced
- error would be corrected (by programmer)
- program can restart from any point
- this is repeated…
- …until all errors are removed…
- …when program will run

[max 4]

(b)
- the compiler creates an executable program
- executable program runs quickly
- executable program prevents customer from re-using code
- customer does not need a translator to run the program
- customer cannot modify the code

[max 3]

(c)
- From each group, max of 2, to a max 3
- produces machine code / executable code
- several instructions for each high level language instruction
- all variables are given addresses
- all constants are given addresses
- relative addresses are calculated

optimisation:
- makes code as efficient as possible
- processing speed is improved
- number of instructions is reduced

[max 3]

3 (a) (i)

- multiple processors used together/simultaneously…
- to perform a single job/different parts of the same program (at the same time)
- program may be split into a number of tasks…
- …each of which may be processed by any available processor

[max 2]

(ii)

fetch	decode	execute	
instruction 1			1st cycle
instruction 2	instruction 1		2nd cycle
instruction 3	instruction 2	instruction 1	3rd cycle
instruction 4	instruction 3	instruction 2	4th cycle

1 mark for each row to a maximum of 2.

[max 2]

(b) (i)

- not suitable for all programs
- program may need to be rewritten **[max 1]**

(ii)

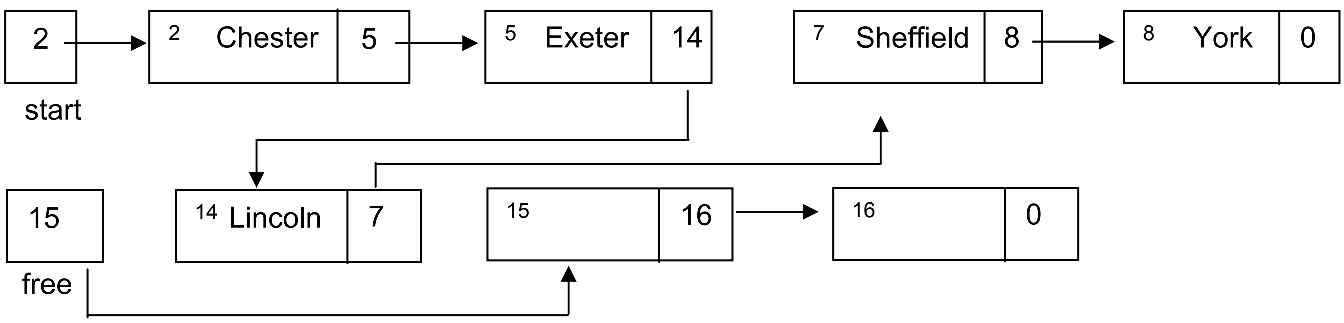
- change in instruction sequence / e.g. jump instruction: requires pipe to be cleared

[max 1]

4 (a) On diagram, marks for

- Lincoln in cell 14
- cell 5 (Exeter) pointer value 14
- cell 14 (Lincoln) pointer value 7
- free pointer 15
- all previous elements of the diagram retained

For example,



[max 4]

(b) **(i)**
- mid point freesia
- daffodil before freesia so use first half of list
- mid point of first half (crocus)
- daffodil after crocus
- only one item (daffodil) remains, so found

(accept clear diagram for full marks)

[max 3]

(ii)
- sequential search checks each item in turn
- (in a binary search) fewer items are checked…
- …as (roughly) half of list rejected at each stage

[max 2]

5 **(a)** **(i)**
- a subprogram that performs a task
- …is given an identifier…
- …the identifier can be used as a program instruction

[max 2]

(ii)
- an item of data/value (of a variable)…
- …supplied to a function or procedure

[max 2]

(b) local variable
- available only in subprogram/section block where declared
- global variable
- available throughout program…
- …including all subprograms

Must show a comparison for 2 marks

[max 2]

(c) class:
- a template for…
- a set of objects
- …that have state and behaviour
- e.g. Book

object:
- an instance of a class
- a real-world entity
- e.g. a named book (any specific example acceptable)

Max of 3 for either to a total of 4

[max 4]

6 **(a)** **(i)**
- a thing about which there is a need to record data
- e.g. Student / Course / other relevant example

[max 2]

(ii)
- a property of an entity
- e.g. Surname / DateOfBirth / CourseId / other relevant example

[max 2]

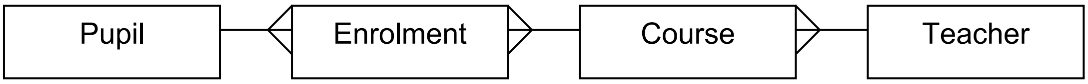
(iii)
- a unique identifier
- e.g. StudentId / CourseId

[max 2]

(b) **(i)**
- studies in many-many
- teaches is many-one

[max 2]

(ii)



one mark each for
- only one extra entity Enrolment (any name)
- 1-many between Pupil and Enrolment
- 1-many between Course and Enrolment

[max 3]

(c) **(i)**
- (a use that is) repeated **[1]**

(ii)
- a choice (of options) **[1]**

(d) **(i)**
- a language used to define the data structure (for a database)
- defines the schema
- specifies the attributes
- …and their data types
- defines any validation rules/constraints
- high level language / 4GL
- defines keys

[max 2]

(ii) a language that allows the user…
- to access / query data
- to store data
- to update data
- high level language / 4GL (if not given as answer in (d)(i))

[max 2]

7 **(a)** **(i)**
- check for full queue
- error if it is full
- move rear pointer to point to new item…
- …insert data at rear of queue

[max 3]

(ii)
- check for empty queue
- error if it is empty
- take data pointed to by front pointer
- …and move front pointer to next item.

[max 3]

(iii)
- e.g. printer queue **[1]**

(iv)
- when a single data item is in queue

[1]

(v)
- can reuse memory/maximise memory use **[1]**

(b) **(i)**
- mantissa 0110
- exponent 0011

[max 2]

(ii)
- (exponent) 0011 = (+)3
- (mantissa) 1.001, move point 3 places to right / 1001
- value is – 8 + 1= -7

[max 3]

8 **(a)**
- a procedure…
- …that calls itself

[max 2]

(b) **(i)**
- 16 **[1]**

(ii)
- 8 **[1]**

(iii)
- 1 **[1]**

(c)
- tail recursion
- the function call is at the end of the expression

[max 2]

Total (86+4) = 90

Mark Scheme 2511
January 2006

1 (a) Give 1 mark per point to a maximum of 2 in each case.

Integrated package
- A single piece of software
- with basic information processing functions
- Usually consists of a word processor, spreadsheet and database
- Each application has a similar user interface
- Easy to transfer data between applications

[2]

Custom written software
- Developed for a specific customer
- to do specific tasks
- Only contains the facilities needed by that customer

[2]

(b) Give 1 mark per point to a maximum of 2

Advantages
- Has already been well tested
- Readily available
- Relatively cheap compared with bespoke software
- Usually large user group to give help
- Usually plenty of text books available
- Training courses available

[2]

Give 1 mark for
Disadvantage
- Has facilities not needed
- Relatively expensive if most facilities not used
- Can be complex
- May not do all that is needed
- May contain far more than is needed
- Some applications may not be used

[1]

(c) Give 1 mark per point to a maximum of 4

- A program (or suite of programs)
- that controls the operation of the computer
- Provides I/O between user and computer
- Provides facilities to transfer data between storage devices
- Acts as an interface between user and computer
- Acts as an interface between software and hardware
- Provides a graphical user interface (GUI)
- Memory management

[4]

2 (a) Give 1 mark per point to a maximum of 2

- A collection of relations/tables (representing entities)
- … consisting of rows representing each member of the entity
- … and columns representing the attributes of the entity
- and relationships
- … connecting tables
- … via primary and secondary keys **[2]**

(b) (i) Give 1 mark per point to a maximum of 4

- Customer places many orders
- An order is for only one customer
- An order is for many products
- A product is on many orders

Answers like

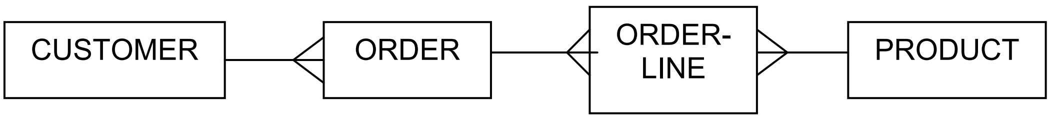
- Customer-order is 1 to many
- Order-product is many to many

can have a maximum of 2 marks **[4]**

(ii) Give 1 mark for

Many to many relationships are not allowed **[1]**

(iii)



Give 1 mark for each of the following to a maximum of 2

- The link entity exists
- … and is suitably named
- ALL relationships are correct **[2]**

(iv) Give 1 mark per point to a maximum of 2

- To reduce redundancy of data/data duplication
- To reduce inconsistency of data
- Reduces inefficiency in accessing data
- Reduces inefficiency in maintaining data **[2]**

(c) ORDER(<u>OrderNum</u>, <u>CustID</u>*, OrderDate)

- Give 1 mark for the primary key (accept OrderNum)
- Give 1 mark for foreign key
- Give 1 mark for OrderDate

ORDER_LINE(<u>OrderNum</u>*, <u>CustID</u>*, <u>LineNum</u>, ProductID*, Quantity)

- Give 1 mark for the primary key (accept OrderNum, ProductID)
- Give 2 marks for at least **two** foreign keys identified
- Give 1 mark if only one foreign key identified
- Give 1 mark for an appropriate additional attribute

PRODUCT(<u>ProductID</u>, Description, UnitCost, NumInStock, ReorderLevel)

- Give 1 mark for the primary key
- Give 1 mark for an appropriate additional attribute **[9]**

3 (a) Give 1 mark per point to a maximum of 2 in each case

World Wide Web
- Collection of information
- … held in multimedia format
- … on the Internet
- … on Web sites
- … in the form of Web pages **[2]**

Internet
- A series of linked computers
- … using telecommunications
- ... worldwide
- … allowing fast communication between people
- … and transfer of data **[2]**

(b) Give 1 mark per point to a maximum of 6

- special instructions to the computer
- … telling it insert a picture
- … change font,
- … link to another file
- Start tags enclosed in angle brackets
- e.g. <HTML>
- … indicates start of instruction
- … which continues until
- an end tag
- e.g. </HTML> **[6]**

(c) (i) Give 1 mark per point to a maximum of 3

- An imaginary button
- … represented by a picture/underlined text/highlighted text/etc
- … can be clicked on to activate some code
- This code gives the address of a file to be loaded
- When clicked the browser looks for the file
- … and loads it
- … or reports it cannot be found **[3]**

(ii) http://www.abpottery.co.uk:potter.html **[1]**

(iii) Give 1 mark for the text and 1 mark for it being underlined (or other clear indication that it is a link)

i.e.: (You can see Ava making pottery at) <u>her wheel</u> (if you are interested). **[2]**

(iv) (The file) potter.html **[1]**

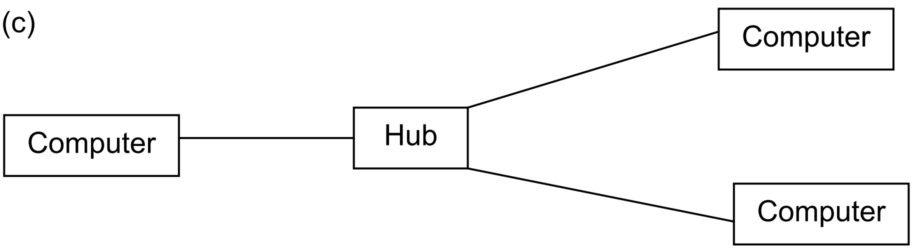
4 (a) Give 1 mark per point to a maximum of 2

- collection of computers
- … connected together over a small area
- … such as a building
- … using cables/radio **[2]**

(b) Give 1 mark per point to a maximum of 2

- Each employee can use any computer
- … and access all data
- … and software
- … and peripherals/printer/storage **[2]**

(c)



Give 1 mark for a **labelled** diagram plus 1 mark per point to a maximum of 3

- Each computer connected directly to hub
- Communications are then from a computer to the hub
- … and from the hub to a computer **[3]**

(d)

Give 1 mark for the labelled diagram (accept a more complex one provided it is labelled) and 1 mark per point to a maximum of 3

- A computer/hub on one LAN is connected to the bridge
- … and the bridge is connected to a computer/hub on other LAN
- Bridge works out locations of the computers on each LAN **[3]**

(e) Give 1 mark per point to a maximum of 4

- Initially, email is sent to bridge
- … which tries to find PC on sending LAN
- If successful bridge notes result
- Otherwise, sends email to other LAN
- … If this is successful, result is noted
- Gradually bridge has a map of positions of PCs
- … so knows where to send the email **[4]**

(f) Give 1 mark per point to a maximum of 2

- Creates error free connections
- Error recognition
- Error correction
- Creates data blocks
- Synchronises data blocks **[2]**

5 (a) Give 1 mark per point to a maximum of 6
Give 1 mark for each section and any other 3 marks

Inputs
- delivery dates of raw materials
- quantities required
- quantities in stock
- number of each type of candle ordered
- machines to be used
- time on each machine
- inspection times
- estimated rejection rates
- tolerances

Processes
- calculate times to produce different candles
- try different arrangements of production paths
- calculate expected times of manufacture
- … with tolerances

Outputs

- expected delivery dates
- … with tolerances
- … and probabilities of accuracy **[6]**

(b) (i) Give 1 mark per component to a maximum of 4

- Minimum duration of each activity/job
- Maximum duration of each activity/job
- Earliest finish time at a node
- Latest finish time at a node
- Nodes/completion points
- Activities/jobs
- Dependencies **[4]**

(ii) Give 1 mark per point to a maximum of 3

- Dependencies may change
- … so many parallel activities may become serial activities
- This will change the earliest
- … and latest finish times at nodes **[3]**

(c) (i) Give 1 mark per point to a maximum of 2

- Each box has a barcode label
- … which is read by the robot
- The barcode indicates the contents of the box
- … which can be looked up in a list **[2]**

(ii) Give 1 mark per point

- Use radio
- … and aerials on the robot
- … in the warehouse
- … in the computer **[2]**

(iii) Give 1 mark per point to a maximum of 3

- Computer works out position of robot (similar to GPS)
- Computer works out the best place to store the candles
- … so that they can be retrieved easily
- … in the right order
- Computer calculates the route to be used
- … and signals the route to the robot
- … keeping track that no errors occur **[3]**

(iv) Give 1 mark per point to a maximum of 2

- Computer signals direction to be taken
- … and monitors the position continuously
- When necessary computer indicates a change in direction
- … continuing to do this until the robot has reached its destination
- feedback from the robot…
- …due to sensor sensing an obstruction
- computer changes route **[2]**

Total 86 (+4) = 90 marks

Report on the Units
January 2006

Chief Examiner Report

The examination went smoothly this Session and a number of candidates did well. There was an improvement in the quality of written communication, which was pleasant to see. A few candidates did not make full use of the contents of questions, particularly the number of marks available for an answer. However, the layout of the examination paper has meant that there has been an improvement in this area. Candidates should make full use of the stem to a question in order to gain high marks; often answers were very generic and did not focus on the particular scenario given.

One point that became very clear in all scripts was that some candidates were entered too soon and needed further study in order to cope with GCE questions. Also noted by many examiners was the fact that the quality of answers was Centre oriented.

2506: Introductory Computer Systems, Communications and Software

General Comments

The majority of candidates seemed to be well prepared for the exam and were able to demonstrate their abilities, at whatever level that happened to be.
There was no evidence of candidates experiencing time trouble although many candidates did fail to give a response to the last question, these were the weaker candidates for whom the last question was not really designed and it was not surprising that in some cases there was no response attempted.
There was a growing amount of evidence that learning is very centre based. There are occasions where all the candidates in a centre fail to answer a particular question. It is evident that the topic concerned has not been covered, hopefully this is a result of entering the candidates a little early and the specification content not being fully covered, rather than some centres trying to predict whether certain topics will or will not be coming up – always a dangerous thing to try.
All the questions managed to elicit the full range of marks possible (yes, there were some candidates who scored 0 on question 1, though one really must question whether anyone who can fail to score on that particular question should be considered ready to be assessed in a Computing examination) and the paper as a whole produced a good spread of marks. It seems that the paper was a fair test of the weaker candidates, allowing them to demonstrate their abilities, while still remaining a challenge to even the most able candidates.

Specific questions:

1 This question was a good discriminator at the weaker end of the cohort, proving more taxing than the examination team had anticipated. There were a few candidates who mixed up input and output devices and a number of candidates who assumed that' because the question was asking about the use of computers in a supermarket, it had to be an Internet application. However, even the more able candidates stumbled on describing an output device. Answers of the type "Displays the results" could apply just as easily to a typewriter or to a piece of paper that has been written on. The failure to state that we were talking about the output from a computer system was simply a result of a certain laziness of approach.

2 A well answered question. Some tried to get two advantages out of sharing hardware and sharing an Internet connection and sometimes the disadvantage was answered in terms of costs though never explained. Diagrams were often not labelled which meant that the reasoning was difficult to follow and the advantages were, once again, often diluted to being "The cost of the system.". A few candidates called the computers on the network 'work stations' or some other name, which implied that this was not a network of computers.

3 Parts a and b were well answered, but part c caused some confusion. The main problem is one of using the words in the question to provide the answer, so a logic error becomes "an error in the logic". It is the logic error which causes most confusion, largely because it is an error in the design and the concept of designing something is anathema to most candidates. It was good to see some variation in the example of the syntax error even if it was the use of the word 'prunt' rather than 'prnt'!

4 Most candidates responded well to this question, though there are still papers that insist that on-line means connected to the Internet. This unfortunate common-usage leads candidates astray, the definition used being the one in the BCS 'Glossary of Computing Terms'.

5 Some good answers with most candidates doing well on the first two parts.

6 a) Few candidates were comfortable with the concepts involved in using top down design or procedures. Many who scored well in (iii) gave the impression of having stumbled across correct responses by accident. Centres, generally, are advised that this is an area of the specification which could well reward some further work with candidates.

b) Well answered in the main. Most candidates were able to identify two techniques, those who failed to pick up the description mark tended to fall short because of a failure with having the command of language to satisfy the examiners that they knew what they were talking about.

7 This was not intended to be as difficult a question as it turned out. It ended up being a very good discriminator at the higher level. Binary addition was well answered, though many doubtless turned the numbers into denary before turning the answer back to binary. Success with the subtraction was very Centre based although it is clearly a part of the Specification. However, the surprise to the examiners was the difficulty caused by the sign magnitude number, the majority of candidates failing to realise that the answer was negative and giving the answer 182.

8 Most candidates were quite capable of answering all three parts of the question but failed on exam technique. There were three marks to each part of the question but very few candidates made sure that they had said three distinctive facts about each one.

9 A similar set of responses to question 8. Most candidates could say something sensible about each part of the processor, however, few said two things about each one.

10 This question was a very good discriminator, most candidates being able to pick up a few marks, but very few giving a comprehensive account of the algorithm. This could be in any form which the candidate chose, and examiners searched for possible mark points however the candidate had set the response out. Understandably, most were just too vague to have more than a passing acquaintance with the answer, but some were well reasoned and explained. The acceptable responses to this and all other questions are shown in the published mark scheme.

2508: Computer Systems Development and Practical Applications

General Comments

Generally the performance of the more able candidates is improving in this module. Performance varied from Centre to Centre, with some excellent work produced by the better prepared candidates.

The layout of this question paper continues to help candidates focus on the demands of each question. Reading questions carefully and paying attention to the mark allocation continues to help many candidates achieve their full potential.

Although many Centres are improving in preparing their candidates for this module it would be advisable to take note of the "applications of computing" when delivering this course. Most sections of the Specification are well understood by Centres but section 5.3.5 of the specification continues to cause concern. Candidates often score low marks in questions relating to the content of this section.

Most Centres are using previous papers, mark schemes and examination reports, which can only assist in preparing candidates for this examination.

All candidates seemed to have ample time to complete this exam. It was pleasing to see fewer blank spaces in answer booklets. Most candidates are making an attempt to answer each part of each question. Candidates should be discouraged from rewording the question as their answer, as this does not gain any marks.

Comments on Individual Questions

Question 1

Part (a) was well answered, with the majority of candidates able to state at least four stages of the system life cycle. Very few candidates understood the concept of order or feedback in their system life cycle diagrams.
Part (b) was well answered by the majority of candidates, in naming and describing at least two of the stages. Some candidates confused "Phased" with "Pilot" by naming one of these methods and describing the other.
In part(c), few candidates scored well. Too often they ignored the term "technical" and stated items that would be included in "user documentation" such as FAQ's. Some Candidates need to focus on the language used in their answers as it can be vague. For example, the word "programs" needs to be expanded to "program listings" to achieve a mark for an appropriate item in technical documentation. The answers given in part (e) have improved since this area was last examined. Many candidates were able to achieve half marks by stating the criteria in each case.

Question 2

Candidates did not score well in this question. The terms asked should be well known but too often candidates were only able to give vague explanations. Most candidates were able to score marks by explaining the terms "icon" and "menu". Many candidates confused a screen display with the term "window" or referred to Windows software. "Dialogue box" and "toolbar" were not known by the majority of candidates. Too often candidates reworded the term such as "toolbar" is a "box of tools" leading to no marks.

Question 3
The majority of candidates were able to score marks in this question. While most candidates could describe "bar code", the "use" was often vague such as "supermarket" rather than "scanning items to find descriptions and prices of products". OCR was often confused with OMR in the second method of data capture. Many candidates were able to state an appropriate use for a sensor but could not describe how it is used in data capture.

Question 4
Many candidates, in Part(b), were able to explain why batch processing was suitable for a telephone company but failed to describe what was meant by batch processing in part(a). In part(c) the majority of candidates scored well by naming and describing validation checks. Some candidates were able to give a full description without naming the validation technique leading to full marks. It was pleasing to see candidates referring to the unique 8 digit number in their answers.

Question 5
It was pleasing to see a lot of good answers to this question particularly by candidates who treated it as a question with three separate parts focussing their answers on the individual, the organisation and society in general.

Question 6
Both parts of this question were well answered with many candidates scoring 5 out of 6 marks. Off-the-shelf and custom written software were well known.

Question 7
In part (a) some candidates were able to achieve 1 mark for referring to "human expert knowledge" but failed to score on explaining the other features of an expert system. Again, in part (b), many candidates had difficulty explaining the term *Inference Engine*. These terms were not well known by many candidates.
Part (b), in many cases Candidates who scored low marks in part (a) could not give an appropriate example of their use in the Intensive Care Unit.
Part(c), only a few candidates could describe one or two advantages. This area of the Module specification needs addressed by the majority of Centres.

2509: Systems Software Mechanisms, Machine Architecture, Database Theory and Programming Paradigms

General points:

A number of candidates gave consistently excellent answers and gained high marks. Unfortunately, some candidates appeared ill-prepared for an examination at this level, failing to give adequate answers. Some had learnt a few topics in reasonable detail but either had not finished their revision in time for the examination or had not studied all topics in the Specification.

With better preparation, many candidates could have improved their marks considerably. For any future examinations, candidates should check they have covered all topics in the Specification, work through some past papers while revising and, of course, learn some definitions. In the examination itself they should read each question carefully to check what is required. Many marks were lost, needlessly, in this examination by candidates' carelessness.

Comments on individual questions:

Q1 (a) Many candidates gave "round robin" as their answer. Relatively few of these described time slices correctly, failing to make it clear that very small amounts of time are involved. Segmentation and paging were reasonably well known.

(b) Descriptions of the FAT were very superficial, with many candidates only indicating it is used to find files. The majority of candidates offered little technical detail. It was rare to find answers that included any mention of file size, access rights or use by the operating system.

Most candidates knew the boot file is used to load the operating system.

Q2 (a) Many candidates wrote a standard answer about an interpreter instead of answering the question. Some did not attempt any answer. Poor use of English was also a problem here, as many stated that the interpreter gives "an error" when, presumably, they meant "an error message". Many did not mention that the error must be corrected, or that the program can restart from any point.

(b) Most candidates gained at least 1 mark here, though few gained all 3 marks.

(c) Many wrote correctly about optimisation. Little else seemed to be known about code generation, except, as criticised in a previous report, that it "generates code". A few candidates gave excellent answers.

Q3 (a) Most candidates referred to two processors rather than multiple processors, though most gained at least one mark. Many did not realise that tasks from the same job can be processed at the same time.

The concept of pipelining was known by the majority of candidates.

(b) A pleasing number of candidates gained both marks here. A few thought that the disadvantage of pipelining was that the pipe has to be cleared "when something goes wrong".

Q4 Many candidates gained full marks for this question, showing they were able to apply their knowledge to the examples given.

(a) The most common mistake was to ignore the free space list. Instead of correctly inserting the new data at 14, some candidates used 6 while others used 7 and then moved all the other data along. Many did not understand the concept of leaving data in place while moving pointers.

(b) Some candidates gave a generic answer indicating how to do a binary search but did not apply it to the data supplied. In (ii), many failed to give a clear comparison between the two methods.

Q5 Only a minority of candidates gained good marks in this question.

(a) The most common answer was that a procedure is a list of instructions. Candidates did not seem aware that it is a subprogram that performs a task, nor that it has an identifier that can be used as a program instruction.

Despite following immediately after "procedure", the vast majority of candidates indicated that a parameter gives a range of values for validation or "sets the bounds" for something.

(b) It was pleasing to see good answers about local and global variables: there was a considerable improvement compared with answers about the topic given in previous examinations.

(c) Perhaps through lack of practical experience, many candidates seemed unable to understand this topic. However, some knowledge of object-oriented programming is required. It would help candidates if they learnt some basic definitions of the terms involved, illustrated by clear examples. A simple example such as

class: Animal,
subclass: Cat,
object: Charlie (any named individual cat)

would aid understanding.

Q6 This was an easy question for candidates who had learnt the topic and they gained good marks. It is of concern to examiners that some candidates appeared to know very little about relational databases and could not explain the terms in (a).

(a) The most common mistake was to omit the examples. Another mistake, made by a number of candidates, was to give examples that did not refer to the application stated in the question. Candidates at this level should be able to gain full marks for such questions.

(b) Most candidates gained marks for (i), though a significant number were unable to insert the single link entity and use the correct relationships in (ii).

(c) Answers were very Centre dependent making it clear that many Centres had not covered this topic.

(d) Many candidates appeared to guess answers to this. As always, weaker candidates rewrote the question and gave answers of the form "a data description language is the language used to describe data".

Q7 (a) Answers given to this question showed how little some candidates understand. A significant number of candidates started with a description of a queue (not required in this question) as “FIFO”, they went on to write about inserting or deleting data at any point within the queue. As in Question 4, many kept at least one of the pointers in place and moved data along.

In contrast, the better candidates gave clear, concise answers and gained high marks for this.

(b) This was answered well by a number of candidates, though the quality of answers appeared Centre-based. Many candidates ignored any reference to floating point and tried to use pure binary instead.

Q8 It was most disappointing to see numerous poor answers, with a significant number of candidates gaining no marks at all for this question.

2510: Computing Project

There was a very small entry for this unit at this session and while this raised few issues of general interest there are some points worth noting for future sessions.

The main focus of this unit is systems analysis and working with an end user to provide a solution to a problem. The poorest solutions are as a result of the candidate attempting to be the end user themselves; the best solutions come from finding someone to act as a genuine end user. It is vital that the system requirements come from the end user and that the end user is consulted at every key stage of the process. Candidates who wish to gain high marks must provide convincing evidence for this in their reports. The end user may not always require this solution but must be able and willing to participate in the process as if they did. The end user may be a teacher, though preferably not the subject teacher for this unit, or may be a focus group, for example when producing an educational programme or computer game the end user might be a group of students from the target users who will be consulted at various stages of the solution's development.

Students also need to convince the teacher and moderator that they are able to decide what is and what is not important in their report; the use of appendices asks these people to make their own judgement and the use of appendices is discouraged and often penalises the student. Students should be encouraged to select the evidence they wish to submit and include it at the appropriate point within the body of the project, moderators may not have the time to search for evidence to support a mark from material supplied in an appendix to the report. On a similar point, the inclusion of application generated code, for example from Access, is completely pointless and merely serves to bulk out the project and convince the moderator that the student cannot decide what is or is not relevant. If a candidate has developed some coded solutions macros, then the inclusion of fully annotated code in the design section is appropriate. Un-annotated code will be ignored.

Given that it is appropriate and logical for candidates to include annotated code and other design components in the design section of their report, the requirement for the technical guide to be a stand-alone document is to be withdrawn and candidates may refer to other sections of their report, from within the technical guidance without penalty.

The changing nature of the solutions seen also indicates that a need for a more flexible approach to user and technical documentation may be appropriate. For web based solutions, the end user who commissioned the project may find the technical guide the most appropriate document, the ultimate 'end user' may not require a printed guide at all. In this case the inclusion of on-screen help and guidance is important and creating a printed user guide for someone who will access the site via the web is not appropriate, but the candidate must provide printed evidence of the on-screen help within the report. It is common practice for applications of all types to have a selection of short documents covering getting started, installation of the solution, system requirements, trouble shooting etc rather than a single bulky guide; it is perfectly acceptable for students to reflect this in their work and documentation may not be two distinct documents. Teachers will need to identify clearly where credit has been awarded if this is the case.

The moderators have been pleased with the accuracy of documentation coming from Centres in recent series and would like to thank those Centres who do provide well organised projects and those teachers who supply clear annotation explaining their allocation of marks. If Centres are to take advantage of the flexibility offered by this Module then this good practice needs to be adopted by all Centres.

2511: Integrated Information Systems

General Comments

As usual at this time of the year, the entry for this Module was small. However, the candidates produced a wide range of marks. There were some very good scripts, but there were a few that showed that some candidates were not really ready to take this examination. However, there was only one very poor script that showed that the candidate was nowhere near the standard expected at this level.

The standard of English was better than this time last year although one candidate's work was difficult to read and understand due to poor writing and grammar.

Candidates were better than last January in that there were very few answers such as 'cheaper'. If candidates stated that something was cheaper they nearly always gave a good reason for this answer.

Comments on Individual Questions

Q No)

1) (a) Most candidates scored well but some gave very vague answers to both parts of this Question. Answers like 'Custom-written software is developed for a specific customer' are not worth two marks.

(b) Most candidates scored full marks for this part of the Question.

(c) A number of candidates gave very poor answers. However, there were Centres where nearly all the candidates gained three or four marks. These were usually the larger Centres.

2) (a) Again, candidates from the larger Centres often did well here. However, too many candidates did not understand that a relational database consists of tables and relationships between the tables. A number of candidates talked about files which failed to gain any marks.

(b) Unfortunately, too many candidates gave inadequate answers and only gained two of the four marks. The facts that the one relationship is 1-many and the other is many-many are only worth two of the four marks. Candidates need to state, for example, that a customer can place many orders but an order is from only one customer. Also, an order can contain many products and a product can be on many orders. The latter statement would have helped candidates to understand that the link entity consists of lines from the orders.

Most candidates realised that the E-R diagram is not in 3NF because there is a many-many relationship in it.

In part (iii) nearly all the candidates failed to understand that the crows-feet go on the link entity not the two entities that the link connects.

(c) This was generally very badly answered although there were a number of candidates, again from the larger Centres, who gained between seven and nine marks.

3) (a) Generally, candidates provided good answers. However, a number confused the World Wide Web with the Internet.

(b) Candidates tended to provide three similar answers instead of six distinct answers. Candidates are advised to make use of Mark Schemes from previous examinations to understand what is expected by the examiners.

(c) Most candidates performed well. The main error was in part (iii) where candidates thought that http://www.abpottery.co.uk:potter.html would be shown on the screen rather than her wheel, possibly in blue.

Part (Iv) produced answers like 'the web site' instead of the name of the file. There were far too many very vague answers.

4) (a) Usually well answered.

(b) This was also generally well answered.

(c) Some very good answers were seen but some candidates failed to indicate where the bridge should be placed in order to connect the two networks.

(d) This was not well understood. Few candidates realised that the bridge works out which network a particular PC is on and then stores this information so that it does not have to find the position of the PC in future. They also did not understand that a hub broadcasts and does not send anything directly to a particular PC on the network.

5) (a) This was a Question that was either very well answered (Centre dependent) or very badly answered. Candidates need to look at answers to previous questions of this type in order to understand the input, processing and outputs of a simulation.

(b) Many candidates understood the components of CPA although there were some candidates who clearly had never seen one. The latter failed to understand how allocating resources may change the results obtained earlier.

(c) This was usually answered satisfactorily although some candidates thought that the robot could be hard-wired to the computer, thus trailing an umbilical cord round the warehouse!

The last two parts of this Question usually gained about half marks.

Advanced GCE Computing (3820/7820)
January 2006 Assessment Session

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
2506	Raw	90	68	60	52	45	38	0
	UMS	90	72	62	54	45	36	0
2507	Raw	120						0
	UMS	120						0
2508	Raw	90	65	58	51	44	37	0
	UMS	90	72	62	54	45	36	0
2509	Raw	90	68	60	52	44	37	0
	UMS	90	72	62	54	45	36	0
2510	Raw	120	98	87	76	65	54	0
	UMS	120	96	84	72	60	48	0
2511	Raw	90	66	59	52	46	40	0
	UMS	90	72	62	54	45	36	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3820	300	240	210	180	150	120	0
7820	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3820	18.9	29.7	51.4	67.6	89.2	100.0	40
7820	0.0	40.0	80.0	100.0	100.0	100.0	5

For a description of how UMS marks are calculated see;
www.ocr.org.uk/OCR/WebSite/docroot/understand/ums.jsp

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