

Computing

Advanced GCE A2 7820

Advanced Subsidiary GCE AS 3820

Mark Schemes for the Units

June 2007

3820/7820/MS/R/07

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Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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CONTENTS

Advanced GCE Computing (7820)

Advanced Subsidiary GCE Computing (3820)

MARK SCHEMES FOR THE UNITS

Unit	Content	Page
2506	Introductory Computer Systems, Communications and Software	1
2508	Computer Systems Development and Practical Applications	7
2509	Systems Software Mechanisms	15
2511	Integrated Information Systems	25
*	Grade Thresholds	37

**Mark Scheme 2506
June 2007**

- 1 (a) (i) • Hardware used to give data to the computer [1]
- (ii) • Hardware the computer uses to give information/to show data to the user/reports after processing carried out [1]
- (b) **Any two from:**
- Memory is not large enough to hold all data required by the system
 - When power is switched off memory is wiped
 - Data held on a storage device is still stored when power is off
 - Enables data to be transported from one machine to another
 - To store backups/archives of system
 - Stores user files/operating system/software [2]
- 2 (a) **Any two from:**
- RAM lose its data when power is switched off/ROM keeps its data when power is switched off
 - Data in RAM can be altered whereas in ROM it cannot
(Allow volatile/non volatile once as a replacement for either of the first two mark points)
 - Normally capacity of RAM is greater than capacity of ROM. [2]
- (b) **Any two from:**
- (Parts of) operating system
 - Software (in use)
 - Data (in use). [2]
- (c) **Advantage:**
- Immediately available when processor powered up
- Disadvantage:**
- Cannot be changed/updated [2]
- 3 (a) **Any three from:**
- Controls the entire operation of the computer
 - Controls the hardware /storage/peripherals
 - Controls all Input/Output
 - Provides an HCI
 - Provides security measures
 - Provides a set of utility software/accept an example e.g. virus scanner, translator
 - Acts as an interface between hardware and software
 - Manages jobs on the system/processing
 - Memory management [3]
- (b) **Any three from:**
- Data can be imported...
 - from different software
 - and combined to produce report...
 - on a single window
 - Different software can each be opened in a different window...
 - and be available to allow the user to multi task
 - Can be used to play CDs while user is working. [3]

- 4 (a)
- (i) • Integer
• Always a whole number [2]
- (ii) • Boolean
• Only two possible values [2]
- (iii) • Real/currency
• Value may not be whole numbers of pounds/needs relevant symbol [2]
- (b) **Any three from:**
- (i) • Taken each evening/once per working day
• To another medium
• Kept away from main system/stored in different locations
• Multiple copies
• incremental backups
• Transaction log/file [3]
- (ii) • Transferring data/long term storage [1]
- (iii) **Any two from:**
- To free up space on the file/to save data before it is deleted
• To keep details of completed orders
• ...For analysis over long periods...For legal reasons
• ...For disputed orders [2]
- 5 (a) **Any two from:**
- (i) • Size of data files reduced...
• By removing redundant/duplicated data/encoding data using algorithms
• Needs to be decompressed before use/ returned to original state
• Without loss of data/lossy and lossless [2]
- (ii) **Any two from:**
- Data checked on arrival to...
• ensure it matches what was transmitted
• method: parity/check sum/echoing back. [2]
- (b) **Any three from:**
- Compression needed to speed up transmission...
• because smaller files can be sent more quickly
• (Data needs to be checked on receipt or) errors could cause video signal to break up
• Large quantity of data means more chance of errors occurring
• Would fill bandwidth
• Video may freeze because of time sensitivity of data
• Self correcting procedures would speed up process [3]

- 6 Any three sets of test data and reasons for test.
(3x2, If data not given mark can still be given for reason, max 6)
e.g
- 2,3
 - To test what happens with legitimate data
 - 2,-3
 - To test whether magnitude or size is measured
 - 2,2.5
 - To test whether fractional values are accepted
 - 2, 2
 - To test the outcome when numbers are equal
- [6]
- 7 (a) **Any two from:**
- A unique field
 - used to identify the whole record
- [2]
- (b) **Any two from:**
- (i)
- Keys are stored separately (in an index)
 - Keys are in logical order
 - to allow for binary search method
 - Each key has a pointer to contents of record
- [2]
- (ii)
- Any two from:**
- Key is used as input to an algorithm
 - which produces a location in memory as the output
 - this output is used to find the data/or as a start point for serial search
- [2]
- (c) **Any four from:**
- (i)
- When two different keys hash to the same location
- [1]
- (ii) **Any four from: max 2 per method, max 2 methods**
- The second key is sent to an overflow area
 - where the values are stored serially
 - OR, A linked list is created with
 - the original value being the head of the list and
 - containing a pointer to subsequent values which hash to same value
 - OR, When collision occurs, subsequent locations are inspected
 - serially/sequentially
 - key is inserted at first free location
- [4]
- 8 (a) **Any two from:**
- (i)
- Operating system
 - Software
 - User files
- [2]
- (ii) **Any two from:**
- Purchased software for installation to the system
 - User files for storage or transfer to other machines/or backup
 - Music files/films/encyclopaedias/...
- [2]

- (b) • Any storage device/floppy drive/CD drive/memory stick (accept external hard drive)...
- Any sensible reason/taking back ups of files/reading data from a library presently kept on older storage device/to keep data with the person at all times so that it can be accessed at any machine [2]
- (c) • Multiple bits sent simultaneously/more than one bit at a time/more than one wire used for transmission.
- (i) • Parallel used because speed of transmission important [2]
- (ii) **Any two from:**
- Signal sent to processor...
 - from an external source..
 - requesting (processor) to halt present job and do something else.
 - Different types of interrupt have different priorities [2]
- Any two from:**
- Hard drive will empty data from buffer (while processor does something else)
 - When buffer empty, hard drive needs to tell processor (or it would never know)...
 - so that the processor refills the buffer. [2]
- (iii) **Any two from:**
- Processor needs to send data for storage
 - Hard drive/buffer needs to send interrupt to processor
 - but not both at the same time.
- (Do not allow for anything about data moving both ways) [2]
- 9 (a) **Any two from plus one advantage**
- (i)
- Machines and peripherals...
 - connected to a central backbone
 - May use spurs off the cable
 - May have server/shared peripherals
 - Terminators at ends of cable
 - Advantage: Cheap to set up/minimum cable requirement [3]
- (ii) **Any two from plus one advantage**
- Machines individually...
 - connected to central hub
 - Central server/hub/switch/file server/peripherals
 - Advantage: If one machine/cable fails the rest are unaffected [3]
- (b) **Any two from:**
- Allows manufacturers to design hardware and software for particular layers
 - One layer can be altered without recourse to other layers
 - simply by changing the links between the layers. [2]

10

Any two from:**Control unit**

- Controls the other parts of the CPU
- so that processing can be carried out
- Coordinates the sending of data around the CPU
- Decodes instruction/holds instruction during decoding

Any two from:**Memory unit**

- Stores data/instructions
- currently in use by the processor
- Only contents of memory unit can be used by the CPU

Any two from:**Arithmetic logic unit**

- Carries out all calculations...
- and logical operations/decision making
- Acts as a gateway between the CPU and the rest of the system.

[6]

11 (a)

- Module 1: 1
- (1 mark for final output is 1, 1 mark for no other output given)

[2]

- Module 2: 5 1 1
- (1 mark for 5 1, 1 mark for final 1 with no other output)

[2]

(b)

- While loop does not need to be executed at all/condition at start of loop
- Repeat loop must be executed at least once/condition at end of loop

[2]**TOTAL (86 + 4) = 90 MARKS**

Mark Scheme 2508
June 2007

- 1 (a) 1 mark for method/1 mark for advantage/1 mark for disadvantage for each of three methods

Observation (1)

Advantage:

- Allows the analyst to see a current process at first hand (1)
- Analyst can get a “feel” of user competence and abilities in doing a task (1)
- Analyst can get idea of time required to do a task, constraints and strengths of current system (1)
- Does not require employee to leave their job(1)

Disadvantage:

- Users may respond differently if they are being observed (1)
- Lack of interaction between analyst and user (1)

Interview(s) (1)

Advantage:

- User can express their opinions in a detailed way (1)
- More factors may come to light as the user answers questions (1)
- Questions can be modified according to answers given(1)
- User may feel valued by the personal nature of interview (1)
- Analyst and user can build up a working relationship(1)

Disadvantage:

- Time consuming for analyst to gather facts (1)
- Users may not tell the truth if they feel intimidated (1)
- Suggest answers the analyst may want! (1)

Questionnaires (1)

Advantage:

- A lot of data can be collected in a short period of time(1)
- Efficient in terms of time (1)
- Useful when a little information is required (1)
- Not difficult to complete(1)
- Direct data entry/OMR/can be distributed electronically(1)

Disadvantage:

- Difficult to design (1)
- Inflexible opportunities to respond (1)
- Low return rate from staff (1)

Record/document inspection (1)

Advantage:

- Analyst can get an idea of the volume of data stored (1)
- See how data is collected/stored (1)
- Can inspect how data is verified/validated (1)
- See how data is processed (1)

Disadvantage:

- Limited interaction with potential users (1)
- Time consuming..(1)
- if there is a large volume of files (1)

Group Meetings/Interviews/Discussions (1)

Advantage:

- Quicker than individual interviews..(1)
-as you can get group opinions/wide variety of thoughts (1)
- True picture of what’s actually happening..(1)
- which may not be the same as how management are thinking (1)

Disadvantage:

- Individuals may not contribute (1)
- A wide variety of thoughts making it difficult to establish user needs (1)

[9]

(b) Any four from:

- Acceptance testing (1)
- End-users are using the software on a day to day basis with realistic volumes of actual data (1)
- Ensure the system meets their needs/requirements (1)
- Report faults/errors back to analyst (1)
- Suggests changes/modifications to the system (1)
- Tests with real data (1)
- Reasonable response time (1)
- Easier to use than the old system (1)
- User interface is clear (1)
- Output as expected (1)
- Security is appropriate (1)
- Beta Testing(1)
- End user is an expert on the requirements of the system(1)

[4]

(c) Any three x 2 marks**Direct changeover/Big Bang (1)**

- Old systems stops and the new system begins (1)
- No overlap between systems/no part changeover (1)
- If new system fails old system cannot be used (1)

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)

Pilot changeover (1)

- New system could be used in a few areas of the college initially (1)
- The results could be compared against the other areas that use old system (1)
- Roll out the new system if successful/abandon the new system if unsuccessful (1)

Phased changeover / gradual changeover (1)

- Each part of the existing system is changed over separately (1)
- Each part can be tested separately (1)
- May take a long time for the whole system to be changed over (1)

[6]

(d) Any three from:

- **Suitability**/Does the system really provide a solution to the problem?/Does the system meet the user requirements?/Does the new software integrate with the existing software? (1)
- **Effectiveness**/Does the system do what it is supposed to do?/Does the system suffer from bugs?/Are the access times for data retrieval acceptable?/Is the hardware/software reliable? (1)
- **Usability**/Do the users find it easy to use the system?/Do the users require continuous training?/Is the on-line help/tutorials useful?/Do they have quick access to information?/Do users save time not having to carry out tedious/repetitive tasks? (1)
- **Maintainability**/Will it be easy to maintain?/any shortcomings to be modified?/adding new modules?/on-line upgrades? (1)
- **Security** of data/Is the data secure against unauthorised access?/ Are the data/software backups taking place?/Are users coping with passwords/user id's? (1)

[3]

(e) Any two from:

- To allow debugging of programs. (1)
- To assist future software developments/upgrades. (1)
- To modify existing file/data structures. (1)
- To support new technical staff. (1)
- To allow software/new software to be installed(1)

[2]**(f) Any four points from:**

- **Corrective maintenance/**Correcting errors in the system (1)
- Software is not performing tasks (1)
- Errors/bugs removed from the software/Debugging (1)

- **Adaptive maintenance/**Changing needs of the system (1)
- Identifying other user requirements (1)
- Changes in legal requirements/government policy (1)
- Changes in organisation practice (1)

- **Perfective maintenance/Software is performing task specified (1)**
- But the system may be too slow in response times (1)
- Due to increase in volume of data (1)
- Improving performance (1)

[4]**2 Any three x 2 marks**

- Range check (1)
- Check lower and upper limits of data value (1)

- Existence check / lookup check (1)
- To check that the data appears / exists on the computer system (1)

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

- Field length check (1)
- The number of characters entered is within the pre-defined limit / 4 digits (1)

- Presence check (1)
- To check that data has been entered (1)

- Integrity/ cross field check (1)
- Confirming the value of a piece of data by comparing it with other data (1)

- Check Digit(1)
- Extra digit, calculated from the number(1)

[6]

3 Barcode

- 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)
- Match bar code against stored database(1)
- Data is in numeric format (1)
- Built-in check digit used for validation (1)
- **Uses include:** 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.

Voice Recognition

- Data is input in audio form (1)
- Directly through microphone (1)
- Sound is digitised(1)
- Indirectly through a tape ... (1)
- Software analyses sound inputted (1)
- Matches against a library of sounds (1)
- Match found, it is processed (1)
- Else new sound generated, processed and stored (1)
- **Uses include** Security systems/dictating text into a word processor, instructions to a robot, mobile telephone (1)

Touch Screen

- User can make selections by touching the screen (1)
- They operate by means of criss-crossing beams of infrared light / wires (1)
- Embedded just in front of the glass (1)
- When the user's finger touches the screen two sets of rays are blocked given an x-axis and a y-axis point (1)

Uses include – banks, tourist offices, museums, information kiosks, Telephones/ PDA, restaurants etc (1)

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)
- **Uses include:** Application – turnaround document in billing, scanning a hard copy into a word processing (1) or reading documents for the blind (1)

[12]

4 1 mark for software type and 1 mark for suitable reason for each or up to 2 marks for reasons, with a maximum of 2.

- **Desktop publishing software/word processing software (1)**
- Can produce high quality graphics and text (1)
- Can integrate text/graphics (1)
- Can use a newsletter template (1)

- **Database software/Spreadsheet software (1)**
- Can create a suitable record structure (1)
- Can query/add/delete/amend member details (1)

[4]

5 (a) Any four from:

Custom-written

- Designed to do exactly what the user needs/Fits user requirements exactly (1)
- Programs can be written to run on existing hardware/comply with new hardware purchased (1)
- To integrate with existing software(1)
- Minimal change to working procedures of organisation (1)
- User support can be geared to meet user needs (1)
- No excess functionality (1)
- Sell copies to other similar users to recoup development costs (1)
- Program maintenance may be easier (1)

(b) Any four from:

Off-the-shelf

- Readily available (1)
- Third party user documentation available (1)
- Shared development costs (1)
- Tried and thoroughly tested (1)
- Extremely reliable (1)
- Third party training (1)
- Compatibility with other users of the software (1)

[8]

6 (a) **Any two x 1 mark****Batch Processing**

- All data to be input is collected together (1)
- In a single operation (1)
- Before being processed (1)
- Together as a batch (1)
- Similar data(1)
- Similar processing(1)
- Processed at a convenient time(1)
- Off-Line/Minimal human intervention(1)

Any two x 1 mark**Interactive Processing**

- Provides the user with fast responses/Time delay in processing is insignificant to the user
- There is dialogue between user and computer
- A transaction is processed before another one is accepted
- User able to alter data on the systems
- On-line processing(1)

[4]

(b) **Any two x 1 mark****Batch processing**

eg:

- Payroll for staff (1)
- Producing statements for customers (1)
- Updating standing orders/direct debits (1)
- Adding/deleting interest payments to accounts (1)
- Backup the database(1)

Any two x 1 mark**Interactive Processing**

eg:

- Enquiries from customers (1)
- Updating customer balances before making withdrawals at ATM/branch (1)
- Customers requesting a new cheque book/service/statement (1)
- Customers wishes to change their PIN (1)

[4]

(c) **Any three x 2 marks**

- User interface (1)
- To allow communication between the expert system and the real world (1)
- Building society can input application details (1)
- Results can be fed back (1)

- An inference engine (1)
- Contains the reasoning method used to search the knowledge base (1)
- Looking for mortgage information (1)

- A knowledge base (1)
- Contains facts and relevant data to a specified application (1)
- Facts and relevant data about mortgage conditions (1)
- Adding rules (1)
- That can be applied to the facts

- A rule base (1)
- Part of the knowledge base which is made up of all the rules (1)
- ... known to the expert system (1)

[6]

- 7 (a) **Any three x 1 mark**
Form driven interface
- An on-screen form looks similar to a hard copy version (1)
 - Similar layouts help transcription at the input stage (1)
 - They enable data to be entered in a pre-determined and structured way (1)
 - User normally enters data into boxes provided which makes it easier for novice users (1)
 - Each text box is labelled with a field name (1)
 - List (or drop-down lists) boxes can be used to control what is entered (1)
 - Radio buttons and check boxes can be used to enter data (1)
 - If data types or data formats are not applied by the user automatic error dialogue boxes will appear (1)
- (b) **Any three x 1 mark**
Command line interface
- Requires the user to learn a large number of commands (1)
 - Use must key in commands(1)
 - Idea of prompting the user for a command (1)
 - It also requires the ability to join commands to form instructions (1)
 - The syntax in the command line is critical / will not operate if typed incorrectly (1)
 - Not easy to use for the inexperienced user (1)
 - Experienced users who are familiar with all the commands would find this interface quite fast compared to other types of interfaces (1)
 - Single commands can allow the user to perform powerful operations (1) [6]
- 8 (a) **Any two x 1 mark, Advantages to employer**
- No need to rent expensive offices in cities (1)
 - Saving money on heating/electricity (1)
 - More opportunities to employ disabled people (1)
 - Less absenteeism (1)
 - Wider pool for staff recruitment as location is no longer an issue (1)
- (b) **Any two x 1 mark, Disadvantages to employer**
- Difficult to log the hours of employees/monitor employees (1)
 - Initial set-up costs (1)
 - Lack of teamwork spirit (1)
 - Security issues when transferring data (1)
 - Greater reliance on technology (1)
 - Initial costs in setting up this system (1) [4]
- (c) **Any two x 2 marks**
- Difficult to monitor individual applications (1)
 - on whether they are abiding to the principles of the act (1)
 - Individuals may find it difficult to source (1)
 - who is holding personal data about themselves (1)
 - The changing nature of technology (1)
 - requires constant reviewing of data protection legislation (1)
 - Some parts of the world/outside the EU (1)
 - May not comply to data protection law (1) [4]
- TOTAL (86 + 4) = 90 MARKS**

**Mark Scheme 2509
June 2007**

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- c) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

- | | | | | |
|---|-----|------|--|---------|
| 1 | (a) | (i) | <ul style="list-style-type: none">• supplies personal settings | [1] |
| | | (ii) | <ul style="list-style-type: none">• use of backing store...• as if it were additional memory• uses paging• holds part of program not in use | [max 2] |
| | (b) | (i) | <ul style="list-style-type: none">• each user is unaware of other users• users do not need to understand network operating system tasks• users are unaware of hardware actions• users are unaware of software actions | [max 2] |
| | | (ii) | <ul style="list-style-type: none">• packets from different users...• arrive at print server...• and are stored in a different file for each user• when file is complete...• its reference is added to the print queue...• and files are printed in turn• mention spooling• priorities | [max 4] |

- 2 (a)
- reserved words/standard components are replaced by tokens
 - variable names are checked
 - variable names are entered in the symbol table
 - constants are entered in the symbol table
 - data type (/space) required is entered in the symbol table
 - error reporting occurs
 - unnecessary characters (white space, comments) are removed
 - program is formatted ready for the next stage/syntax analysis

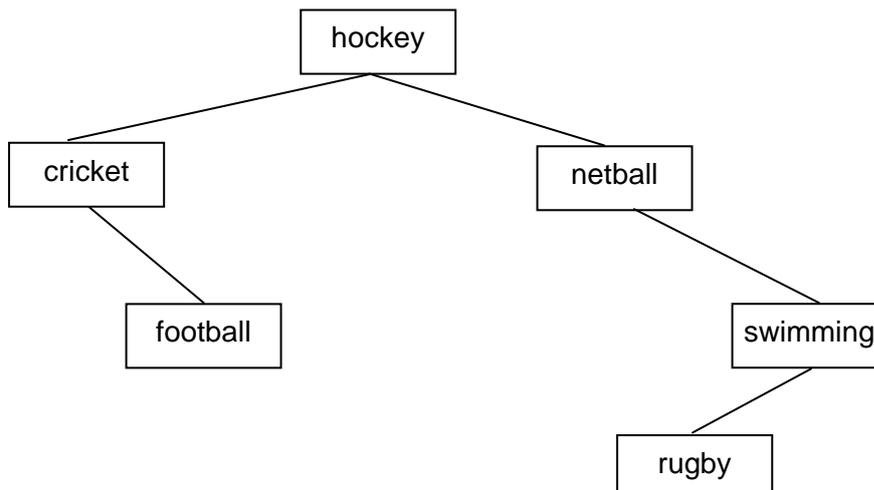
[max 3]

- (b)
- during syntax analysis
 - statements are checked against the rules of the language
 - uses symbol table
 - (if statements are not valid) errors are reported...
 - to alert the user/programmer

[max 3]

- 3 (a) (i) • address of next instruction [1]
- (ii) • increment to address of next instruction...
• every time an instruction is fetched
• change to address part of instruction.../change to start of ISR
• when it is a jump instruction/when an interrupt occurs [max 4]
- (b) (i) • faster when processing large amount of data
(in the same way)...
• as each item has its own processor/items are
processed at the same time [2]
- (ii) • no increase in speed...
• as each calculation is done separately
• so von Neumann is (at least) as fast [max 2]

4 (a)

*Marks for*

- root
 - left subtree
 - right subtree
- [3]**

(b) (i) • queue **[1]**

- (ii) • item:=MyData (start)
- start := start +1
- [2]**

- (iii) • an error on attempting to add a data item...
- when last position is used/when queue is full
 - when free and start have the same position
- [max 2]**

- (iv) • dynamic can change in size
- static is fixed size
- [2]**

(c) (i) • in same order **[1]**

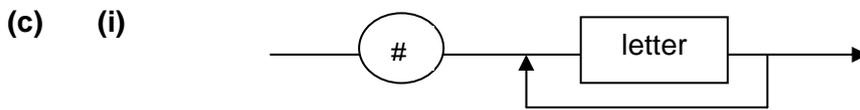
- (ii) (Ann, Bill, Katy, Kunal, Luisa, Majid, Omar, Rashmine, Sam, Tom)
- correct order
 - all names used
- [2]**

(iii) Marks for

- open existing files
- create new file
- check existing files are not empty
- use pointers/counters to identify records for comparison
- repeat
- compare records indicated by pointers
- copy earlier value record to new file
- move correct pointer
- until end of one file
- copy remaining records from other file
- close files
- assume common key
- assume if 2 records are the same, only 1 is written to new file

[max 6]

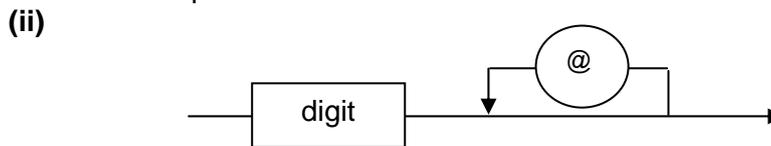
- 5 (a) (i) • uses fixed memory location/not relocatable/limited address range [1]
- (ii) • modifies the address...
 • ...by adding the number...
 • ...from the index register [max 2]
- (iii) • easy to alter the index register
 • easy to access a range of memory locations (eg for an array) [1]
- (b) (i) • only 1 letter allowed/2 letters used [1]
- (ii) • ends with letter/must end with digit [1]
- (iii) • 5 is not a digit [1]



Marks for

- # & letter in order (no other terms)
- repeat around letter

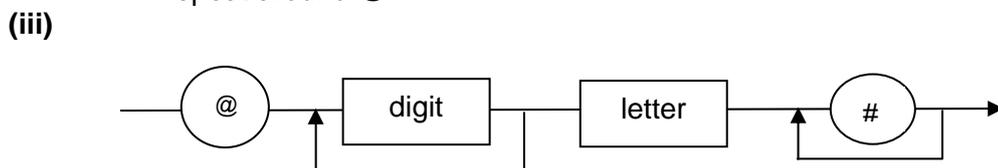
[max 2]



Marks for

- digit & @ in order (no other terms)
- repeat around @

[max 2]



Marks for

- the 4 terms in order (no other terms)
- repeat around digit
- repeat around #

[max 3]

- 6 (a) • (notation used for) primary key. [1]
 • must be unique.

(b) Attribute	Data type	Min (bytes)	Max (bytes)
DogNumber	number/integer/text	2	4
Name	text	10	20
Age	number/integer/byte	1	4
Breed	text	13	25
	total	26	53
	x600	15600	31800
	overheads (+10%)	1560	3180
	new total	17160	34980
	÷ 1024 (approx)	17K	35K

Accept numbers in range given by minimum and maximum.

Marks for

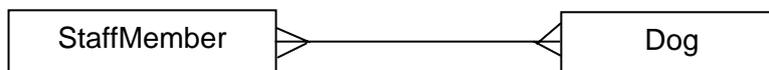
1 mark each for any 3 correct rows in original table

- total
- x600
- overheads
- ÷ 1024
- answer in range showing correct units

[max 6]

- (c) (i) • many-many [1]

(ii)

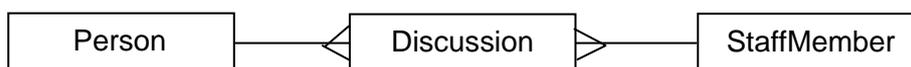


[1 mark for both symbols correct]

- (d) • DogNumber is primary key in Dog... [max 4]
 • ...& is foreign key in Meeting
 • used to link tables/create relationship
 • relationship is one-many...
 • so foreign key is at "many" end of the relationship

- (e) (i) • many-many relationships are not allowed [max 2]
 • avoid duplicate data

(ii)



Marks for

- insert link entity...
- ...with meaningful name (eg Discussion or PersonStaff)
- correct symbols on relationships

[max 3]

- (f) • to create tables/attributes [max 2]
 • define data types
 • define primary/secondary keys
 • define validation rules
 • define access rights/setting up security

- 7 (a)
 - (Teacher =) ahmed
 - (Teacher =) cooper [2]
- (b) (i)
 - predicate...
 - which may have arguments
 - something that is always (unconditionally) true
 - eg teaches (jones, art) [max 2]
- (ii)
 - a query to be solved
 - eg teaches (Teacher, maths)? [2]
- (iii)
 - after finding a solution for a goal
 - or a goal fails
 - go back to an earlier point...
 - and take an alternative route
 - eg after step 5, step 6 is same as step 3 [max 3]

TOTAL (86 + 4) = 90 MARKS

**Mark Scheme 2511
June 2007**

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the standardisation meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- c) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, Para 17, page 26*)

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

- To describe the context of the problem
- To evaluate the problem
- To see if it is financially/economically feasible
- To do a cost-benefit analysis
- To see if it is technically feasible
- To see if it is legally feasible
- To see if it is operationally feasible
- To see if it is socially feasible
- To see if it can be developed in a reasonable time

[3]

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

- Organise stages of development
- Control the stages of development
- Set deadlines
- Ensure completion of tasks
- ...before continuing
- Ensure completion of documentation
- ... and reports
- State any problems that still have to be solved
- Organise resources
- Produce Gantt/CPA charts

[4]

(ii) Give 1 mark for the name and up to 3 marks for the description.

Name CPA (PERT)/Gantt Chart

Description

- Allows project to be split into small components
- ... each of which can be planned separately
- Can link different parts together
- ... so that a calendar can be produced
- Can show dependencies
- Can show earliest start times
- Can show latest start times
- Can show earliest finish times
- Can show latest finish times
- Can show tasks that can be done at the same time
- Can allocate resources
- Can show effects of limited resources
- Automatic updating
- Critical path can be found

[4]

(iii) Benefits, max 2.

- Easy to keep track of progress
- Shows when project is overtime
- Shows results of shortage of resources
- Gives warnings when something is wrong
- Shows effects of time changes
- Faster to produce diagrams
- Easier to modify diagrams
- Eliminates human error in calculations
- Allows timely allocation of resources
- Allows efficient allocation of resources

Give 1 mark per point for drawback, max 1.

- Takes time to learn how to use software
- Diagrams can become complex
- Takes time to collect data
- Takes time to define order of tasks
- Not cost effective for small projects
- Software can be expensive
- Training costs can be high

[3]

(c) Give 1 mark for the method and 1 mark for the reason in each case. Maximum of 2 cases.

Method

- Interview/meeting

Reason

- Only 3 people involved/easy to see everyone involved
- Easy to go back and gather further information

Method

- Observation

Reason

- Small business/easy to see all that is going on

Method

- Reading documents

Reason

- Documents easily available/shows what data is input/shows what data is output

[4]

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

- Input design
- Output design
- File structures
- Data structures
- Diagrammatic structure of system
- System flowcharts
- Data flow diagrams
- Entity Relationship diagrams (ERD)
- Document flow diagrams
- Hardware requirements
- Software requirements
- Accept objectives
- Data dictionary

[4]

(b) Give up to 2 marks per requirements (Max 10).

Hardware

- PCs with screen, mouse & keyboard
- Electronic till linked to PCs
- Magnetic strip scanner
- Chip and pin reader
- Bar code scanner
- Printers
- Modem/router/hub

Operating system

- Network operating system
- GUI (for general users)
- Command line (for network manager)

Utility software

- Automatic backup
- File manipulation
- Fire wall/anti-spy ware
- Virus checking
- Formatting/defragmenting
- Drivers
- Compression
- System restore

Application software

- Software for accounts
- Database software
- Word processing software
- DTP software
- Stock control software
- Web design software

Communication

- Wireless comms/cables
- Network cards
- Network software
- Switching router
- Communications software

[10]

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

- Identify the modules to be used
- Specify the modules to be used
- Identify the main data structures
- Identify the main algorithms
- Describe the algorithms in pseudo-code
- ... or a structure diagram
- ... and test them
- produce any programs/writing code
- ...including databases
- ... financial files
- ... and test them
- Produce interface
- Produce documentation
- Prototyping
- Data dictionary

[3]

(d) Give 1 mark for each part

Method

- Big Bang/direct changeover

Description

- New system replaces old system without overlap

Reason

- Small business/No computer system

OR

Method

- Phased

Description

- Different parts implemented at different times

Reason

- Can still do some tasks manually while staff get used to system gradually **[3]**

(e) Give 1 mark per point to a max of 3.

- Need to address any problems not previously identified
- Need to modify software for new circumstances
- eg amount of data increases
- eg new areas need to be incorporated
- eg data needs to be processed differently
- ... due to change in legal requirements
- Hardware needs replacing
- New facilities needed
- Changing business methods
- New technology

[3]

- 3 (a)** Give max of 1 mark from
- Can use classes defined by others
 - Can reuse code
 - Imported classes are reliable
 - Saves time/effort
 - Increases data integrity
 - Can use inheritance
- [1]**
- (b)** In each case give 1 mark for the meaning and 1 for the example.
- (i)** encapsulation
- methods & properties/data hidden from user
 - data only accessed via methods
 - eg Plant has height & price (data) & Print (method)
- [2]**
- (ii)** class
- a template for an object
 - defines methods & properties/data
 - eg Plant
- [2]**
- (iii)** derived class
- result of inheritance
 - has another class's methods & properties plus its own
 - eg Flower is derived from Plant
- [2]**
- (iv)** inheritance
- properties and methods of one class can be used in another class with modifications
 - eg Plant can be used (with modification) in Plant & Flower
- [2]**
- (c) (i)** Touch (sensitive) screen. **[1]**
- (ii)** Give 1 mark per point, max 2
- Ability of customers
 - Short-term memory
 - Ease of use
 - Little previous experience/No experience required
 - Self-explanatory
 - Consistent interfaces
 - Need for help (screens)
- [2]**
- (iii)** Give 1 mark per point, max 2
- No training available
 - Users may not be computer literate
 - Probably nobody that the customer can ask for help
 - Users often nervous about using computer equipment
- [2]**

(d) Give 1 mark per point, max 4

- Personal data can be used to promote the business
- ... and if lost can involve loss of customers
- ... hence loss of sales/income
- Data of customers can only be recollected if customer returns
- If database of plant information lost, expensive to collect data again
- ... and to re-enter it
- Lack of this database can reduce sales
- ... because of lack of information for customer
- Follow-up sales are possible
- Can sell data
- Shows trends in sales
- Can be used to affect production

[4]

- 4 (a) Give 1 mark per description

SUPPLIER - PRODUCT

many-to-many/many suppliers supply many products & many products are supplied by many suppliers

PRODUCT - ORDER_LINE

1-to-many/product is on many orderlines and an orderline has one product

ORDER_LINE - CUSTOMER

many-to-1/order lines for 1 customer but a customer may have many order lines [3]

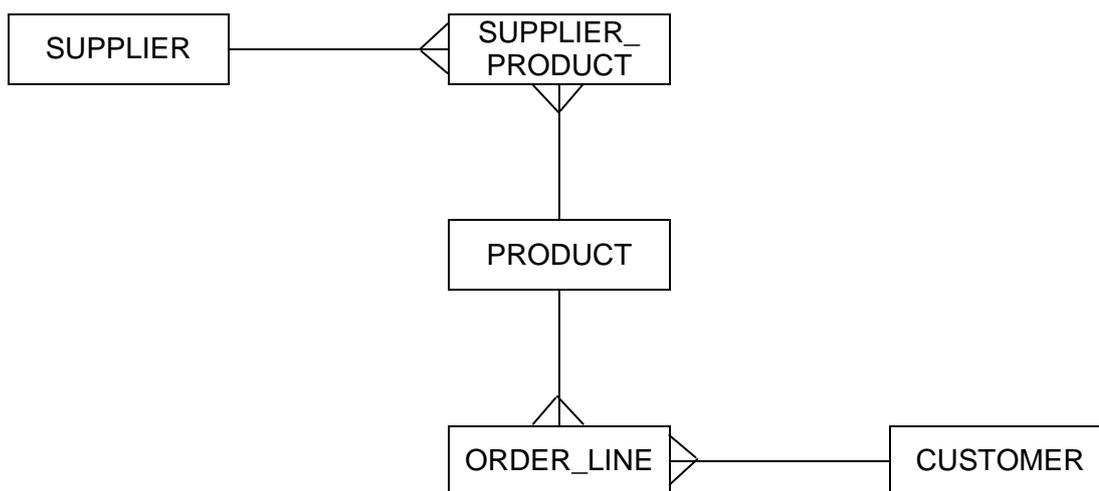
- (b) many-to-many relationships not allowed in 3NF/causes data redundancy/causes data duplication/can cause inconsistent data [1]

- (c) Give 1 mark for each of the following, max 2

SUPPLIER_PRODUCT/link entity

SUPPLIER-SUPPLIER_PRODUCT relationship

SUPPLIER_PRODUCT-PRODUCT relationship [2]



- (d) Give 1 mark for each entity and 1 mark for each reason

Entities

- SUPPLIER_PRODUCT
- ORDER_LINE

Reasons

- Need to connect SUPPLIER_PRODUCT to SUPPLIER & PRODUCT
- Need to connect ORDER_LINE to PRODUCT & CUSTOMER [4]

5 (a) Give max 2 marks per facility

- Place orders
- ... safely
- ... using credit/debit card

- Search for information
- ... about products
- ... including prices

- Enquiry system
- ... about products/delivery
- ... using email

- Returns
- ... can get address for returns

[4]

(b) (i) To enable the user to navigate the site/www

[1]

(ii) In each case, give 1 mark per point, max 2

Hotwords

- Words marked by underlining/different colour
- ... that allow a user to click on them
- ... and causes the computer to link to another site/part of current site

Buttons

- Labelled rectangles/shapes
- ... that allow a user to click on them
- ... and causes the computer to link to another site/part of current site

HTML

- Mark-up language
- ... developed for multimedia documents
- ... such as www pages
- Contains Tags for a browser
- ... to indicate how to display content
- Includes content
- ... and links to other documents

[6]

6 Give 1 mark per point, max 6.

- Use temperature sensors
- ... in the glasshouses
- Set max and min temperatures/temperature range
- If temperature too high
- ... turn off heat
- ... open windows
- If temperature too low
- ... close windows
- ... turn on heat
- Place humidity sensors in soil
- Set max and min humidity/humidity range
- If humidity too high
- ... turn off sprinklers
- If humidity too low
- ... turn on sprinklers
- Repeat the loop until system turned off
- Readings can be taken at regular intervals
- Uses real-time processing
- Uses A-D converters
- Uses D-A converters
- Use of actuators

[6]

Total = (86 + 4) = 90 marks

**Advanced GCE Computing (3870/7820)
June 2007 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	86	73	61	49	37	0
	UMS	120	96	84	72	60	48	0
2508	Raw	90	71	63	55	47	39	0
	UMS	90	72	62	54	45	36	0
2509	Raw	90	68	62	56	50	44	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	61	55	49	43	38	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	9.3	27.3	49.3	70.9	85.3	100	1041
7820	11.1	31.3	57.6	81.3	95.7	100	605

Xxxx candidates aggregated this session

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

Statistics are correct at the time of publication

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