

CAMBRIDGE INTERNATIONAL EXAMINATIONS
Higher International General Certificate of Secondary Education

COMPUTER STUDIES

1276/01

Paper 1

October/November 2003

Additional Materials: Answer Booklet/Paper

3 hours

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, music or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

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Page 1

This document consists of 4 printed pages.



- 5 (a) Explain the meaning of the terms
- (i) paging memory,
 - (ii) segmenting memory. [2]
- (b) Job A needs five pages of memory, Job B needs one page and Job C needs three pages. The jobs are stored in memory in adjacent pages. There is no space between the programs. The memory consists of 12 pages.
- (i) Draw a diagram showing how the jobs are stored in memory. [2]
 - (ii) Job B terminates and Job D, which needs four pages of memory, is ready to be loaded. Draw a diagram showing the contents of the memory after Job D has been loaded. [1]
 - (iii) Explain what steps the operating system has to take to make sure program D will run correctly. [2]
- (c) Explain how virtual memory can be used to run a very large program when there is not enough memory to store the whole program. [4]
- 6 (a) Using examples from a high-level language of your choice, explain the meaning of
- (i) data type,
 - (ii) constant,
 - (iii) variable,
 - (iv) expression,
 - (v) assignment statement. [10]
- (b) Give **three** advantages of using functions and procedures when developing a complex program. [3]
- (c) With the aid of an example, explain the meaning of an object and encapsulation in Object Oriented Programming (OOP). [3]

Answer all questions

- 1 An organisation has a large number of employees in many countries.
- (a) State **four** email facilities that the organisation would find useful. In each case give a reason why the facility would be useful. [8]
 - (b) Explain the stages that take place when an email is sent from an employee in Cambridge to an employee in Namibia. [4]
- 2 An expert system is to be built for diagnosing faults in personal computers.
- (a) Name and describe the **two** main components that are used in an expert system. [4]
 - (b) Explain how the system will use these two components to diagnose a fault. [3]
 - (c) State the output that should be produced by the system in this case. [2]
- 3 (a) Explain the meaning of the terms
- (i) privacy of data,
 - (ii) integrity of data. [2]
- (b) Explain the importance of security in a system that
- (i) processes junk mail,
 - (ii) controls a nuclear power station. [8]
- (c) Explain the meaning of the term computer hacking. [2]
- 4 (a) State an application that uses batch processing. Explain why batch processing is appropriate to your application. [4]
- (b) Using a diagram, show how a transaction file and a master file are used, in a batch processing system, to create a new master file. You should include, in your diagram, any reports produced. [6]

- 7 (a) Explain the purpose of
- (i) an editor,
 - (ii) a debugger
- when developing a computer program. [2]
- (b) Describe **three** facilities you would expect to be available in a debugger. [3]
- (c) State the types of test that must take place when developing a complex program consisting of many modules. [3]
- (d) Using examples, explain the meaning of
- (i) syntax errors,
 - (ii) logic errors
- in a program. [4]
- 8 (a) A queue is to be stored in an array of fixed size. Create algorithms that will
- (i) add an item to the queue, [4]
 - (ii) remove an item from the queue. [4]
- (b) A linked list is to be used to hold details of students. The list is to hold the data in alphabetical order of students' names.
- (i) Draw a diagram to show how an item is added to the list. [3]
 - (ii) Create an algorithm to add an item to the list. [7]

1276/1 Computer Studies

October 2003

Mark Scheme for Revised Draft

1. (a) Give 1 mark for each example and 1 mark if it is explained well to a maximum of 8 marks.

Forward – can pass message directly to appropriate person electronically.

Automatic reply – can set up automatic acknowledgements/replies.

Group mail – can send an email once to many people.

Attachments – can attach one copy of a document and it can be sent to all recipients.

Express – can mark an email as urgent.

Confirmation – can confirm recipient has received the email [8]

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

email passed to local server/ISP

then passed round a network of servers

until the recipient's server/ISP receives it

receiver collects the email when logged on

email uses ISP addresses to direct the email [4]

2. (a) Give 1 mark per point.

Knowledge base

contains all the facts *on PC faults*

Rule base

contains the rules for manipulating the facts [4]

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

Asks user for symptoms

Searches data base for corresponding facts

uses rules to compare facts [3]

- (c) Give 1 mark per point to a maximum of 2 marks.

produces a list of possible faults

with probabilities of each [2]

3. (a) (i) Data is only available to those entitled to it [1]
 (ii) Data is accurate [1] [2]

(b) Give 1 mark per point.

- (i) (I) Not important
 The data is not usually private
 (i) (II) Very important
 Changes in data can cause catastrophic effects

 (ii) (I) Not particularly important
 The process can always be re-run
 (ii) (II) Very important
 Errors can have catastrophic effects [8]

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

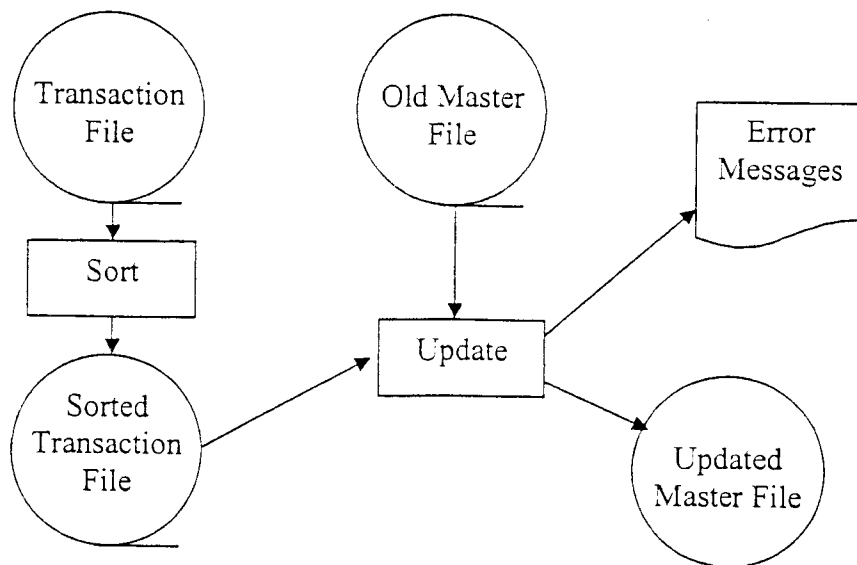
Attempting to get unauthorised access
 for unauthorised use of data
 or programs [2]

4. (a) Give 1 mark for a sensible application (e.g. payroll, cheque clearing, production of bank statements, etc.)

Give 1 mark for each of the following to a maximum of 3 marks.

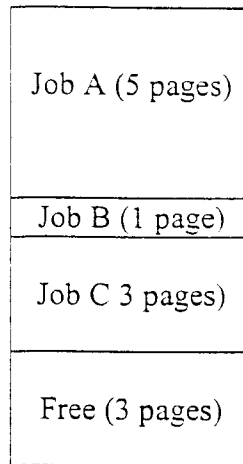
There are large quantities of data
 which can be collected together before processing begins
 All requiring similar processing
 Can be done on a regular basis (e.g. each night) *(not needed immediately)* [4]

(b) Give 1 mark for each object (need not be same shape) to a maximum of 6.

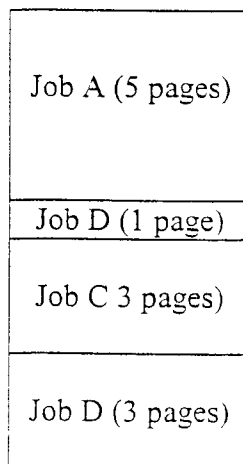


[6]

5. (a) (i) Dividing memory up into areas of equal size.[1]
 (ii) Dividing memory up into unequal sized areas [1] [2]
- (b) (i) Give 1 mark for the Jobs being contiguous and 1 mark for 3 pages of free space.



- (ii) Give 1 mark for D being split a shown. [2]



- (iii) Give 1 mark for each point to a maximum of 2 marks. [1]

OS notes position of start of Job D
 Stores addresses of start of each page
 in a table [2]

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

Loads as much as possible into memory
 When code not loaded is needed
 Decide where it is to be placed
 Save any data that is using area to be used
 Load code required [4]

6. (a) In each case give 1 mark for the example and 1 mark for the description.

- (i) e.g. Integer/Single/Float/etc.
Tells the translator what type of data is to be stored
 - (ii) e.g. 3.14/ "Roger"/212
Data that cannot be changed
 - (iii) e.g. Total
Value that can be changed while the program is running
 - (iv) e.g. total + number or age > 45
it results in a value
 - (v) e.g. total = total + number
the value of the expression on the right is given to the variable on the left
- [10]

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

- Breaks program down into simple tasks
 - Can use more than one programmer
 - Code can be used many times without rewriting it
 - Code can be used in other programs
 - Makes software easy to maintain / *debug*
- [3]

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

- An object is an instance of a class
e.g. car reg. no. W123ARB is an instance of the class of cars
 - Encapsulation is grouping data and methods of accessing data into one unit
 - The data can only be accessed via the class methods
- [3]

7. (a) (i) An editor is used to enter the code ready for translation
(ii) A debugger is used to find errors in a program [2]
- (b) Give 1 mark per point to a maximum of 3.
- A watch window
Break points
Ability to change variable values
Single step function
An indication where an error has occurred [3]
- (c) Give 1 mark per point
- Module test
Module integration test
User acceptance test
- (d) (i) e.g. Plint for Print [1]
A mistake in the rules of grammar [1]
(ii) e.g. $a + b$ in place of $a - b$ [1]
Program tells the computer to do the wrong operation [1] [4]
8. (a) (i) Give 1 mark for each of the following points in the algorithm to a maximum of 4.
- Test for full queue
Error message for a full queue
For non-full queue stores data in cell pointed to by tail pointer
Increments tail pointer
Allows for circular queue [4]
- (ii) Give 1 mark for each of the following points in the algorithm to a maximum of 4.
- Test for empty queue
Error message for empty queue
For non-empty queue copies data in cell
Increments head pointer
Allows for circular queue [4]
- (b) (i) Give 1 mark for each of the following points to a maximum of 3.
- Diagram shows:-
an initial list with pointers
a list with pointers changed to show insertion of a new cell
a free list
showing where cell has come from [3]

- (ii) Give 1 mark for each of the following points in the algorithm to a maximum of 7.

Check for empty list

For empty list sets head to point to a free cell

Inserts data into cell pointed to by head

Adjusts pointer to free list

For non-empty list:-

Inserts data into a free cell

Adjusts pointer to free list

Linearly searches list for first data item > data to be stored

Inserts data immediately before this data

Adjusts pointer in new cell to point to next cell or end of list

[7]