Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Education
January 2004
Advanced Level Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

COMPUTING **CPT5**
Unit 5 Advanced Systems Development

Thursday 22 January 2004 Morning Session

No additional materials are required.
You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this paper is 65.
- Mark allocations are shown in brackets.
- You will be assessed on your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate.
- The degree of legibility of your handwriting and the level of accuracy of your spelling, punctuation and grammar will also be taken into account.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
8			
9			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

LEAVE MARGIN BLANK

Answer **all** questions in the spaces provided.

1 State **two** ways in which a computer system could convert text into a form that is easier for a partially sighted person to understand.

1 .....

2 .....

(2 marks)

2

2

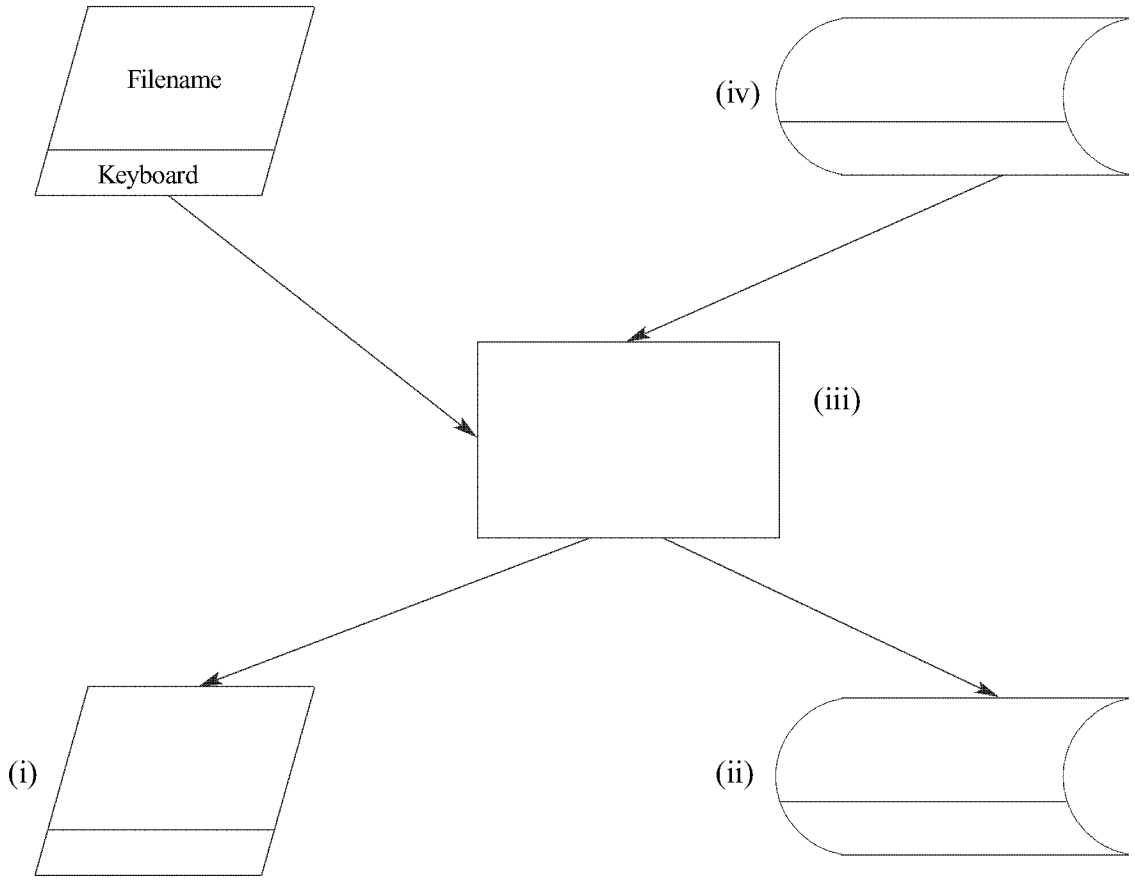

Figure 1

The chart in **Figure 1** describes the hardware and software components of a system that is used to format an unformatted file. A computer program, **Format**, reads the unformatted file (e.g. X.ufmt) from **magnetic disk** and writes its formatted form to a new file (e.g. X.fmt) on the same **magnetic disk**. The **filename** of the file to be formatted is entered through a **keyboard**. Any errors are sent in an **error report** to a **printer**.

(a) What is the name given to the type of chart shown in **Figure 1**?

.....

(1 mark)

(b) Fully complete the chart in **Figure 1** by filling in (i) to (iv) above.

.....

(4 marks)

5

3 The system designer of a book lending library system for a school has the following hardware in addition to computers with hard disk storage, keyboard, mouse and VDU to choose from:

Barcode scanner
Fingerprint scanner
Label printer
Laser printer
Touch sensitive screen

(a) For **each** of the above give **one** purpose of its use in this library system.

(i) Barcode scanner .....

.....
(1 mark)

(ii) Fingerprint scanner.....

.....
(1 mark)

(iii) Label printer.....

.....
(1 mark)

(iv) Laser printer .....

.....
(1 mark)

(v) Touch sensitive screen.....

.....
(1 mark)

(b) Describe the principles of operation of a touch sensitive screen.

.....

.....

.....

.....
(2 marks)

7

TURN OVER FOR THE NEXT QUESTION

4 (a) The logical schema is one level of the three level Database Management System (DBMS) architecture. Name the **two** other levels.

1 .....

2 .....

(2 marks)

(b) Give **two** data definition language (DDL) commands that could be used in the formation of the logical schema of a database.

1 .....

2 .....

(2 marks)

(c) Given a choice of databases, state **one** reason why a database programmer might choose to use an ODBC(Open Database Connectivity)-compliant database.

.....

.....

(1 mark)

5

5 **Figure 2** is one presentation slide from a presentation of 50 slides. A macro is used to change the logo ϕβα to **AQA** and the font style to italics in all 50 slides.

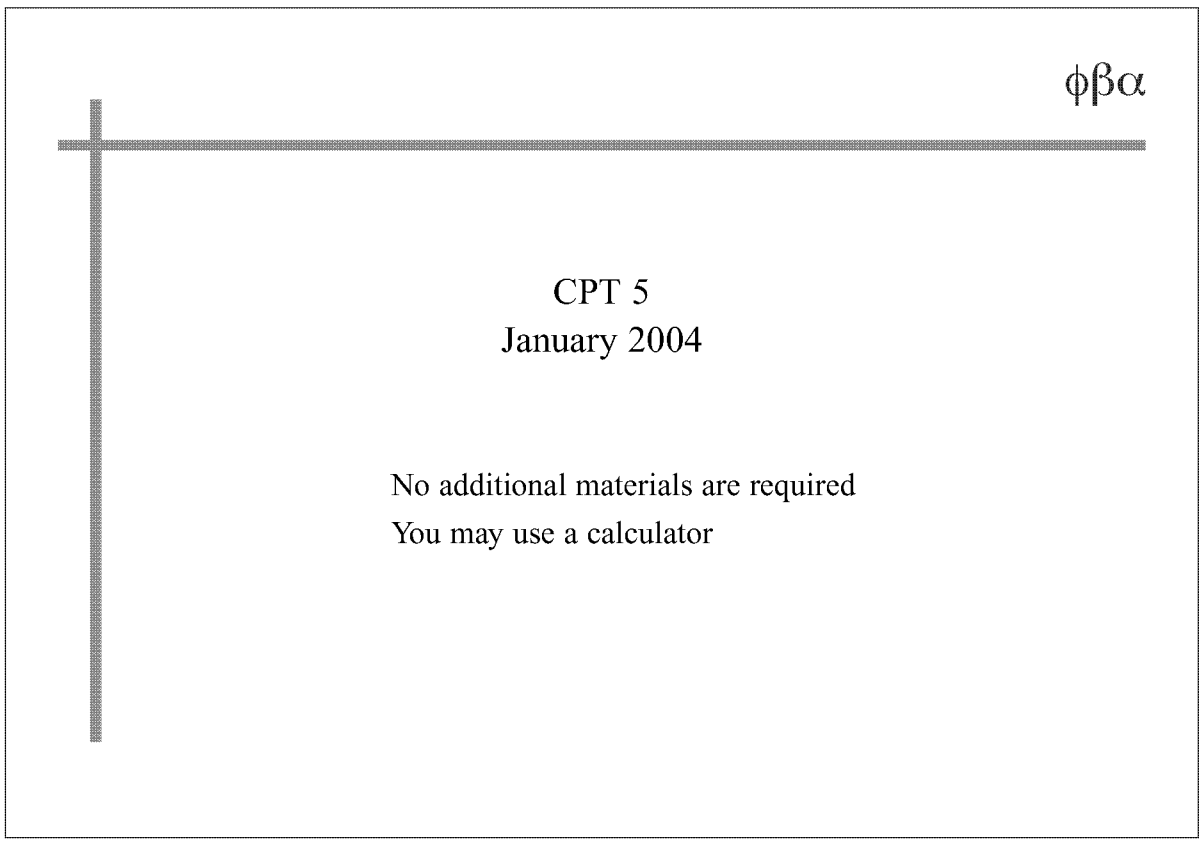

Figure 2

The presentation software supports the following macro commands:

Start recording
Stop recording
Run macro.

Explain how to create this macro using these commands..

.....

.....

.....

.....

(3 marks)

3

TURN OVER FOR THE NEXT QUESTION

6 **Figure 3** below shows the HTML form of a web page.

```
<HTML>
  <HEAD>
    <TITLE>
      AQA
    </TITLE>
  </HEAD>

  <BODY>

    <H1>Registering Your address</H1>
    <FORM ACTION="http://www.aqa.org.uk/asp/getaddress.asp" METHOD=POST>

        <P>Your address: <INPUT TYPE="text" NAME="MyAddress">
        <P>
        <INPUT TYPE="submit" NAME="submit" VALUE="Send address">
    </FORM>
  </BODY>

</HTML>
```

Figure 3

With reference to the contents of **Figure 3**, draw a labelled diagram to show the appearance of the web page when viewed through a web browser.

(5 marks)

7 A department of local government responsible for recreation and the environment has printed leaflets of scenic walking routes in its area. **Figure 4** below shows details which are recorded in an un-normalised relational database table. The data requirements specify that

- A leaflet references one or more routes.
- A route is referenced in at most one leaflet.

LeafletID	Leaflet Name	Leaflet Cost	Quantity In Stock	RouteID	Route Name	Route Area	Route Description
1	Wendover Hills	£1.10	1000	1 2 3	Chequers Monument Clock Tower	Ellesborough Ellesborough Wendover	Relatively hilly Flat Flat
2	Halton Woods	£1.20	2000	4 5 6	East Halton West Halton Middle Halton	Halton Halton Halton	Hilly Relatively flat Flat
3	Penn	£1.00	1500	7 8	Penn Woods Penn Village	Penn Penn	Relatively hilly Flat
4	Bierton	£1.00	800	9 10	Canal Bierton Village	Bierton Bierton	Flat but muddy Flat
. . .							
56	Chesham Bois	£1.00	900	141 142	East Woods West Woods	Chesham Chesham	Hilly and muddy Hilly and muddy

Figure 4

The relation for this table is as follows

LeafletRoutes(LeafletId, LeafletName, LeafletCost, QuantityInStock,

RouteId, RouteName, RouteArea, RouteDescription)

(a) What makes this table un-normalised?

.....

.....

(1 mark)

(b) When the data in **Figure 4** is stored in a fully-normalised relational database, two relations **Leaflet** and **Route** are used. For **each** of these, complete the relations making sure that the primary key attribute(s) are underlined.

(i) **Leaflet**(.....

.....)

(2 marks)

(ii) **Route**(.....

.....)

(3 marks)

Turn over ▶

(c) Complete the entity-relationship diagram for the entities **Leaflet** and **Route**.

(1 mark)

(d) Problems with particular routes are logged in the relational database. These problems are reported in e-mails sent by people walking the routes for which leaflets are available. The relational database includes two extra fully-normalised relations **Person** and **Problem** for this purpose.

Person(PersonId, Surname, Title, EMailAddress)

Problem(ProblemId, DateReported, ProblemDescription, RouteId, PersonId, ReplySent)

Using the SQL commands

SELECT, FROM, WHERE, ORDER BY

and any others which are considered appropriate, write an SQL statement to query the database tables for all surnames and e-mail addresses of people who have reported a problem before 1st January 2004 and the corresponding RouteIds. The result of the query is to be ordered in ascending order of RouteId.

.....

.....

.....

.....

.....

.....

(6 marks)

(e) Name the **type** of package which would be most suitable to use with the database or on its own for creating:

(i) a mail merge operation to send personalised letter attachments with each e-mail;

.....

(1 mark)

(ii) the design of the leaflets in a printer-ready form;

.....

(1 mark)

(iii) a simple accounting record of leaflet sales.

.....

(1 mark)

16

TURN OVER FOR THE NEXT QUESTION

8 The program shown in **Figure 5** computes the result of dividing an integer **x** by an integer **y** using integer division, e.g. 6 divided by 4 = 1 remainder 2. The result is displayed on a VDU using the program statement

```
Write (`Answer= `, ComputeResult(s, t));
```

```
Program IntegerDivision;
Var s, t;

Function ComputeResult(x,y);
  Var r, q;
  Begin
    r := x;
    q := 0;
    While  r > y
      Do
        Begin
          r := r - y;
          q := q + 1
        End;
    ComputeResult := q
  End;

Begin
  Write(`Input s: `);
  Read(s);
  Write(`Input t: `);
  Read(t);
  Write(`Answer= `, ComputeResult(s, t));
End.
```

Figure 5

(a) When s = 6 and t = 3 the answer displayed on the VDU is 1. This is wrong. It should be 2.

(i) Which testing strategy, **white box** or **black box**, is the most appropriate to use to discover why the wrong result is calculated? Justify your answer.

Strategy.....

(1 mark)

Justification .....

.....

(1 mark)

(ii) What correction should be made to the function **ComputeResult** to make it work correctly with s = 6 and t = 3?

.....

.....

(2 marks)

(b) When s = 2 and t = 0 the program fails to produce any output at all and does not terminate. State why this happens.

.....

.....

(1 mark)

(c) The following specification was supplied to the programmer by a customer:

A function is required which divides x by y using integer division giving q, the number of times that y fits exactly into x, and remainder r such that

x = y* (result q) + (remainder r)

How should this specification be changed to prevent the program error that occurred, as described in part (b) above, from arising again?

.....

.....

(1 mark)

(d) The error in the program, as described in part (a) above, was the programmer's fault. The error described in part (b) was the fault of the customer who supplied the specifications. Explain why acceptance testing may not have revealed the error described in part (b).

.....

.....

.....

(1 mark)

9 The branches of a large supermarket chain and their suppliers use EDI (Electronic Data Interchange) over a *wide area network* (WAN).

(a) What would EDI be used for in this application?

.....

.....

(1 mark)

(b) What is a wide area network (WAN)?

.....

.....

(1 mark)

(c) The supermarket chain faced a choice between using its own private WAN or one operated by a VAN (value-added network) provider for its EDI.

(i) Give **one** advantage of using a private WAN operated by a VAN provider over using its own private WAN.

.....

.....

(1 mark)

(ii) Give **one** advantage of using a private WAN rather than a public network such as the Internet for EDI.

.....

.....

(1 mark)

Figure 6 below shows the local area network (LAN) of the supermarket chain's head office.
It consists of three Ethernet bus segments with IP addresses 192.80.0, 192.80.1 and 192.80.2 connected together by routers.
IP addresses that begin with 192 are private addresses.
The head office hosts an on-line ordering service for customers on a Web server with public IP address 213.97.56.21.
The Web server and the local area network are connected to the Internet through a router and firewall.
The local area network is a server-based network.
There is one file server and domain controller and one print server.

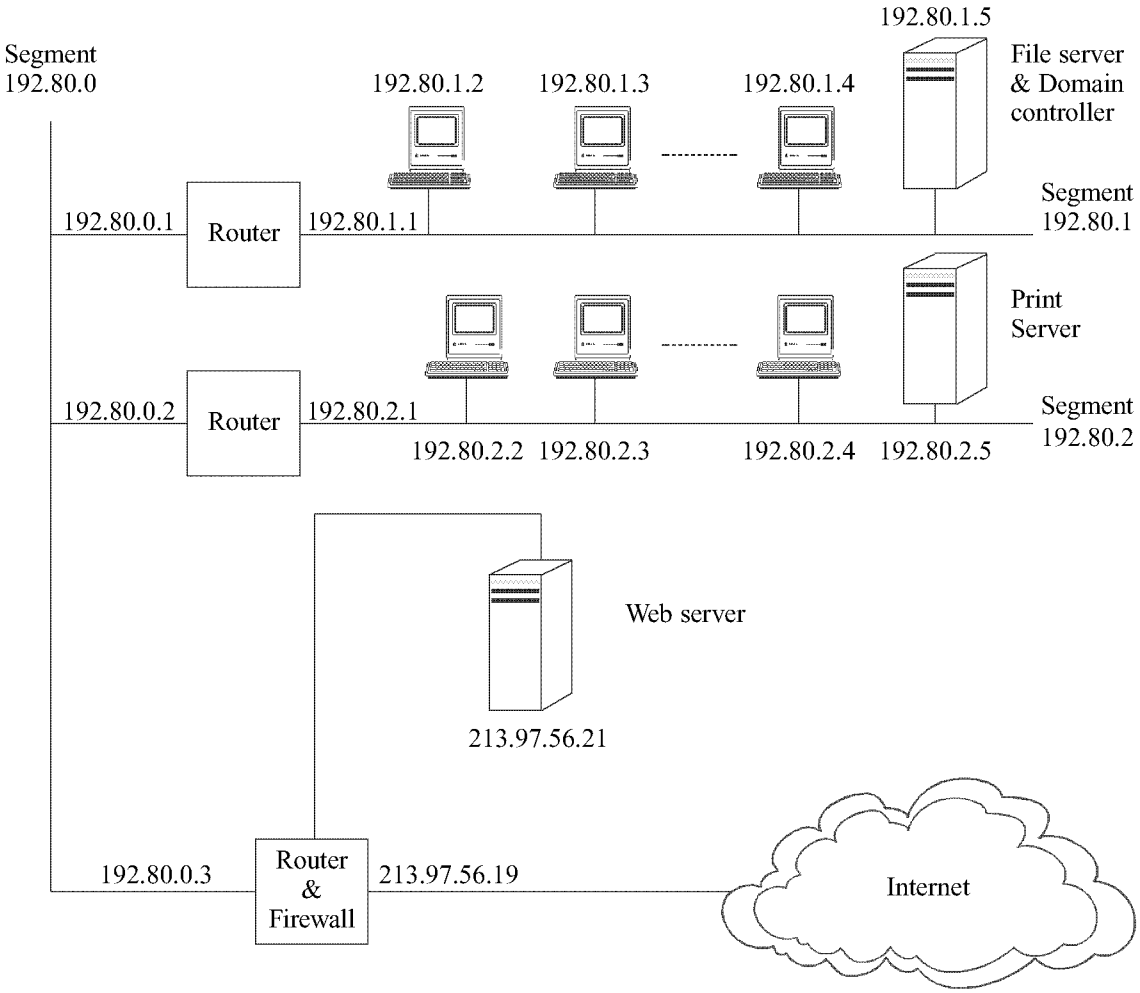

Figure 6

(d) Draw a diagram to show how segment 192.80.1 would be wired using a hub.

(2 marks)

(e) Why must the router-firewall and the Web server have public IP addresses?

.....

.....

(1 mark)

(f) The computer with IP address 192.80.1.3 uses the TCP/IP protocol to send a document to be printed to the print server. Describe how the TCP/IP protocol is used to route the document to its destination. Your description should cover the role of the two routers and network card addresses.

.....

.....

.....

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.....

.....

.....

.....

(5 marks)

(g) State **one** purpose of the firewall in this local network.

.....

.....

(1 mark)

(h) The local area network is a *server-based network.* What is meant by a server-based network?

.....

.....

.....

(2 marks)

15

END OF QUESTIONS