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Centre Number					Candidate Number				
Candidate Signature									

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General Certificate of Education
 June 2005
 Advanced Level Examination



COMPUTING
Unit 5 Advanced Systems Development

CPT5

Tuesday 21 June 2005 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			
10			
11			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

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

- 1 Suggest a suitable type of software package for a school to use for the production of its school magazine.

.....
(1 mark)

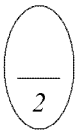


- 2 Several testing strategies are used during the software development stages of a new system. Black box testing is one example. Name **two** others that can be used.

1

2

(2 marks)



- 3 Give **two** fact-finding techniques that a system analyst could use.

1

2

(2 marks)



4

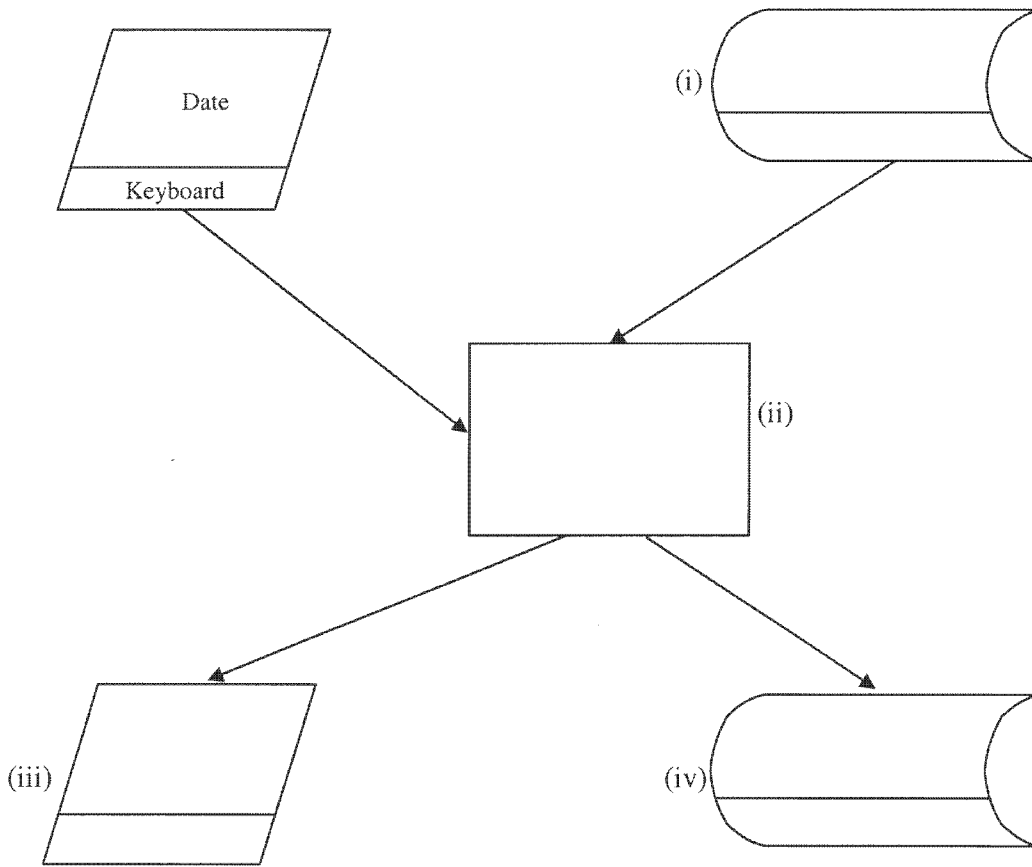


Figure 1

The chart in **Figure 1** describes the hardware and software components of a system that is used to extract from a tennis club members' file the names and addresses of members whose subscriptions are overdue. A computer program, **Extract**, reads the members' file, **Member.Dat** from **magnetic disk** and writes the names and addresses to a new file **Overdue.Dat** on the same **magnetic disk**. The **date** of the run is entered through a **keyboard**. Any errors are sent in an **error report** to a **VDU**.

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

.....
(1 mark)

(b) Complete fully the chart in **Figure 1** by filling in parts (i) to (iv).

(4 marks)

5

Turn over ►

5 A school plans for the school’s canteen to eliminate the need for

- canteen staff to handle cash transactions;
- pupils to pay with cash when purchasing meals.

Instead all payments in the canteen will be made electronically from an “electronic wallet” provided by the school to each pupil.

Pupils will be able to top up their “electronic wallet” at any time at machines located around the school which accept payment by cash, debit card and credit card.

A system designer is employed to design a system for the canteen which supports the

- payment for meals by “electronic wallet”;
- production of menus and price lists for display.

The designer has the following hardware in addition to computers with hard disk storage, keyboard, mouse and VDU to choose from:

- Smart card reader/writer
- Fingerprint scanner
- Touch sensitive screen
- Laser printer
- Impact printer with paper roll.

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

(i) Smart card reader

.....

.....

(1 mark)

(ii) Fingerprint scanner

.....

.....

(1 mark)

(iii) Laser printer

.....

.....

(1 mark)

(iv) Impact printer

.....

.....

(1 mark)

(v) Touch sensitive screen

.....

.....

(1 mark)

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

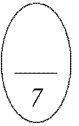
.....

.....

.....

.....

(2 marks)



TURN OVER FOR THE NEXT QUESTION

Turn over ►

6 A company wishes to replace its existing data processing system with a more up-to-date system. After consultation, two alternative methods for converting from the old to the new system are proposed, *parallel* and *phased*.

(a) What is

(i) parallel conversion;

.....
.....
(1 mark)

(ii) phased conversion?

.....
.....
(1 mark)

(b) Describe **two** tasks that may have to be carried out when converting from the old to the new system.

1
.....
2
.....
(2 marks)

(c) The company wishes to assess how maintainable the new system will be. Give **two** specific questions for the company to put to the developers of the new system to help in this assessment.

1
.....
2
.....
(2 marks)



7 One reason why new software systems can fail is the software contains bugs.

Give **two** more reasons.

1

2

(2 marks)

2

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

1

2

(2 marks)

(b) Give **one** data definition language (DDL) command that could be found in a script used to construct a relational database.

.....

(1 mark)

(c) *Object-oriented databases* are set to replace *relational databases* in the future.

What is

(i) a relational database;

.....

.....

(1 mark)

(ii) an object-oriented database?

.....

.....

(1 mark)

5

Turn over ►

9 **Figure 2** shows the HTML form of a web page.

```
<HTML>
  <HEAD>
    <TITLE>
      Collecting Names
    </TITLE>
  </HEAD>

  <BODY>

    <H1>Registering Your Name</H1>
    <FORM ACTION="http://www.names.co.uk/cgi-bin/getname.exe" METHOD=POST>

      <P>Your Surname: <INPUT TYPE="text" NAME="MySurname">
      <P>
      <INPUT TYPE="submit" NAME="submit" VALUE="Send name">
    </FORM>
  </BODY>

</HTML>
```

Figure 2

With reference to the contents of **Figure 2** draw a labelled diagram to show the appearance of the web page when viewed through a web browser.

(5 marks)

TURN OVER FOR THE NEXT QUESTION

Turn over ►

10 An Examination Board records total entries by centre and subject for its examinations for June 2005 in an un-normalised relational database table as shown in **Figure 3**. The data requirements specify that

- a subject offered for examination by the Examination Board has at most one Examination Board Subject Officer;
- an Examination Board Subject Officer may be a subject officer for more than one subject offered for examination by the Examination Board;
- Centre Number and SubjectID are unique.

CentreNo	Centre Name	Centre Address	SubjectID	Subject Name	ExamBoard SubjectOfficer Name	NumberOf Candidates Entered
2345	Broad Street Grammar School	Walton Road,Niver,Yorkshire	4400	Spanish AS	Miss Smith	20
			5500	Chemistry AS	Mr Minns	62
			6600	Physics AS	Dr Jowett	45
2346	Bash Street Comprehensive	French Lane,Therm,Oxfordshire	4400	Spanish AS	Miss Smith	10
			7700	Maths AS	Mr Walton	35
			8800	Biology AS	Mrs Brown	21
			9900	Computing AS	Ms Jones	21
2347	St Trinians Girls School	Wallingbrook,Essex	3310	History A2	Dr George	23
			4410	Spanish A2	Miss Smith	11
			5520	Chemistry A2	Mr Minns	23
2348	GreyFriars	Bunter Road,Warton,Devon	8821	Biology A2	Mrs Brown	18
			8855	French AS	Miss Smith	18
.
9567	Kings College	The Lane, Witherton, Northumberland	2222	German AS	Ms Hilter	20
			3320	Chinese AS	Mrs Cheng	2
			5511	Arabic AS	Mr Abdulla	1

Figure 3

The relation for this table is as follows

ExamBoardEntryNumbers(CentreNo., CentreName, CentreAddress, SubjectID, SubjectName, ExamBoardSubjectOfficerName, NumberOfCandidatesEntered)

(a) What makes this table un-normalised?

.....

 (1 mark)

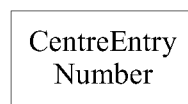
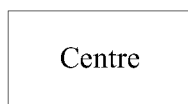
(b) When the data in **Figure 3** is stored in a fully-normalised relational database three relations **Centre**, **CentreEntryNumber** and **Subject** are used. For **each** of these complete the relations making sure that the primary key attribute(s) are underlined.

(i) Centre(.....
.....)
(2 marks)

(ii) CentreEntryNumber(.....
.....)
(2 marks)

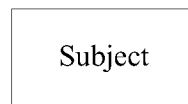
(iii) Subject(.....
.....)
(2 marks)

(c) (i) Complete the entity-relationship diagram for the entities **Centre** and **CentreEntryNumber**.



(1 mark)

(ii) Complete the entity-relationship diagram for the entities **Centre** and **Subject**.



(1 mark)

QUESTION 10 CONTINUES ON THE NEXT PAGE

Turn over ►

- (d) Problems with particular entries are also logged in the relational database. These problems are reported in e-mails sent to the Examination Board by the Examination Officer responsible for a centre's examination entries. The Examination Board may communicate a response via e-mail. The relational database includes two extra fully-normalised relations **ExaminationOfficer** and **Problem** for this purpose.

ExaminationOfficer(CentreNo, ExamOfficerSurname, Title, EMailAddress)

Problem(ProblemId, DateReported, ProblemDescription, CentreNo, ReplySent)

Using the SQL commands

SELECT, FROM, WHERE, ORDER BY

and any other commands which are considered appropriate, write an SQL statement to query the database tables for the surname and centre number of all Examination Officers who have reported a problem before 1st March 2005 and the corresponding description of the problem.

The result of the query is to be ordered in ascending order of CentreNo.

.....

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.....

.....

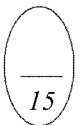
.....

(5 marks)

- (e) Name the type of package which would be most suitable to use with the database or on its own for creating a mail merge operation to send personalised letter attachments with each e-mail.

.....

(1 mark)



11 A company specialising in networking training courses offers the following courses:

- Wide Area Networks
- Asynchronous Transmission Mode (ATM) networking
- Time-division multiplexing.

(a) What is

(i) a Wide Area Network (WAN)?

.....
.....

(1 mark)

(ii) Asynchronous Transmission Mode (ATM) networking?

.....
.....
.....

(1 mark)

(iii) time-division multiplexing?

.....
.....
.....

(1 mark)

QUESTION 11 CONTINUES ON THE NEXT PAGE

Turn over ►

Figure 4 shows the local area network(LAN) of the company. It consists of three Ethernet bus segments with IP addresses 192.80.0.x, 192.80.1.x and 192.80.2.x connected together by routers. IP addresses that begin with 192 are private addresses. The business hosts its own web site 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 database and application server.

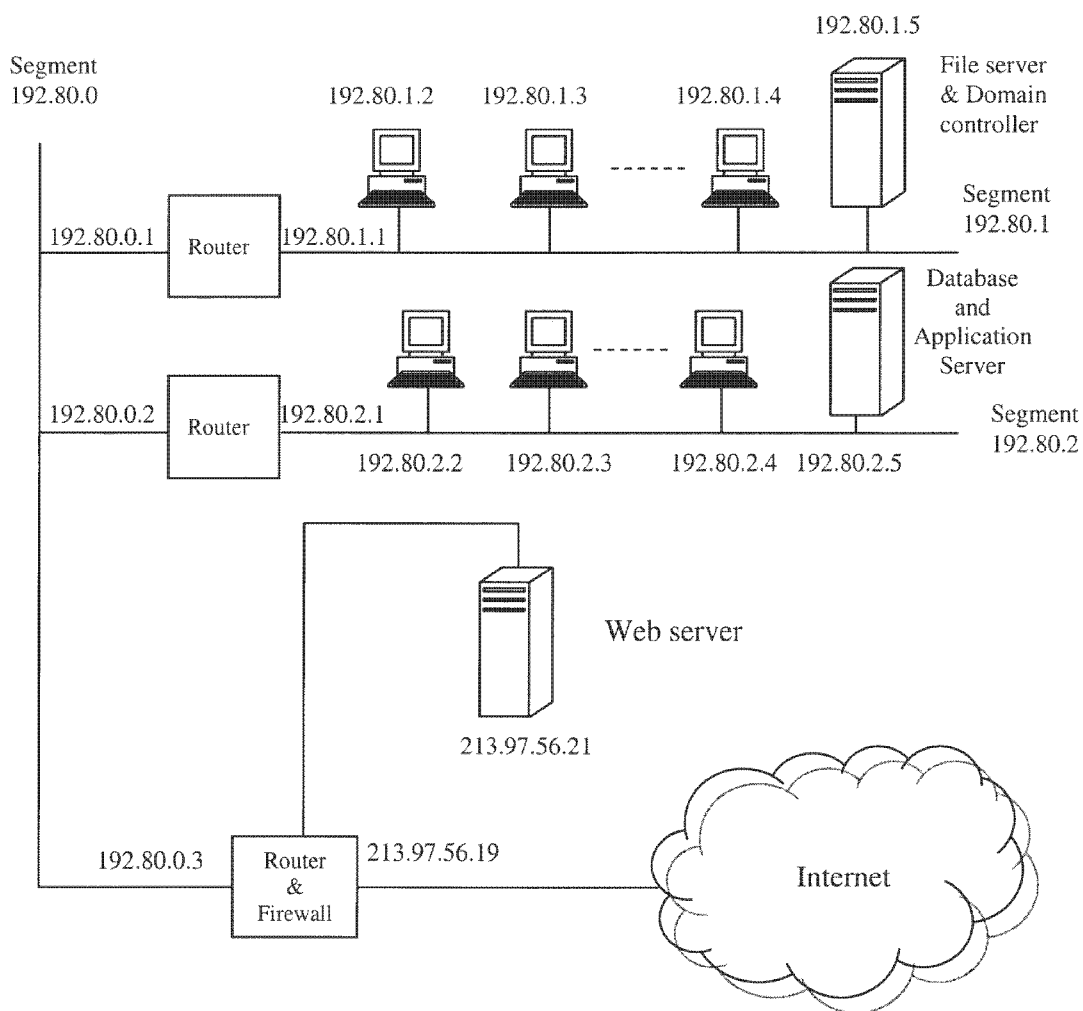


Figure 4

(b) Draw a diagram to show how segment 192.80.2.x would be wired using a hub.

(2 marks)

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

.....
.....

(1 mark)

(d) The computer with IP address 192.80.2.4 uses the TCP/IP protocol to send a web page to the Web server. Describe how the TCP/IP protocol is used to route the web page to the Web server. Your description should cover the role of the two routers and network card addresses.

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.....
.....
.....

(5 marks)

QUESTION 11 CONTINUES ON THE NEXT PAGE

Turn over ►

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

.....
.....
(1 mark)

(f) The local area network is a *server-based network*. What is a server-based network?

.....
.....
.....
(2 marks)

(g) What is a database server?

.....
.....
.....
(1 mark)

15

END OF QUESTIONS