

Surname						Other Names					
Centre Number						Candidate Number					
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For Examiner's Use

General Certificate of Education
 January 2008
 Advanced Subsidiary Examination



COMPUTING **CPT2**
Unit 2 Principles of Hardware, Software and Applications

Monday 14 January 2008 1.30 pm to 3.00 pm

You will need no other materials.
 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.
- Answer the questions in the spaces provided.
- Show all your working.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The maximum mark for this paper is 65.
- The marks for questions are shown in brackets.
- The use of brand names in your answers will **not** gain credit.
- You are reminded of the need for good English and clear presentation in your answers.

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



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

1 (a) What is secondary storage?

.....
(1 mark)

(b) These are examples of secondary storage media:

- DVD-R
- flash memory
- floppy disk
- magnetic hard disk
- magnetic tape cassette.

Select **one** medium from this list for **each** of the following purposes, and explain why your choice is the **most** appropriate.

Your three media should be different.

(i) Storing about 226 Megabytes of files that are accessed and edited regularly, both at work and at home.

Medium

Why appropriate

.....
(2 marks)

(ii) Storing about 650 Megabytes of digital photographs of a family wedding, for distribution to family members.

Medium

Why appropriate

.....
(2 marks)

(iii) Storing software in use on a set of PCs in a school.

Medium

Why appropriate

.....
(2 marks)



2 Many people would choose to send correspondence via e-mail rather than ordinary mail if both were available. Give **three** reasons to support their choice.

1

.....

2

.....

3

.....

(3 marks)

3

3 Describe **each** of the following and explain how each is generated.

(a) A check digit.

.....

.....

.....

.....

(2 marks)

(b) A control total.

.....

.....

.....

.....

(2 marks)

(c) A parity bit.

.....

.....

.....

.....

(2 marks)

Turn over ►

6



4 (a) Identify each of these types of operating system from their description.

(i) The user and the system are in two-way communication; the user supplies commands and data to the system during processing.

.....
(1 mark)

(ii) This type of operating system responds to events within a maximum specified time, and so is suitable for controlling time critical systems.

.....
(1 mark)

(iii) This type of system takes a set of commands or jobs, prepared offline. It executes them at a scheduled time, and returns the results for collection at a later time.

.....
(1 mark)

(iv) This type of operating system enables users sitting at a number of computers to share resources.

.....
(1 mark)

(b) For **each** of these applications, select which **one** type of operating system is the most suitable.

(i) Running a monthly payroll application for a large company.

.....
(1 mark)

(ii) A computer system in a hospital serving all departments and wards.

.....
(1 mark)

(iii) An educational game for young children.

.....
(1 mark)

(iv) Controlling an industrial process that involves regulating the temperature of a furnace.

.....
(1 mark)



5 Modern technology is now extensively used in events such as the Tour de France cycle race. Computer systems are used to collect, process and produce results from the data recorded.

(a) (i) What item of data might be used in the computer system for a cycle race to identify each competitor uniquely?

.....
(1 mark)

(ii) What method of validation could be used to ensure that this item of data represented an actual competitor in the race?

.....
(1 mark)

(b) (i) A stage (section) in such a race is usually many kilometres long, and it is not possible for the organisers to have marshals along the course to keep the whole stage under direct observation.

What equipment might be used to provide input to the system, of where each competitor is at any time during a stage, in case of emergency?

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

(ii) On the mountain stages every competitor must finish within a certain percentage time of the winner. How might each competitor's start and finish times be automatically detected and input to the system?

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

(c) In one particular race, the data about each competitor is stored in a direct access file.

(i) Direct access file organisation makes use of hashing algorithms. Complete the sentence below to explain the purpose of a hashing algorithm.

A hashing algorithm uses as its input
to
(2 marks)

(ii) Give **two** properties of a good hashing algorithm.

1
2
(2 marks)

Turn over ►



- 6 A student has set up a spreadsheet, shown in formula view in **Figure 1(a)**. **Figure 1(b)** shows the contents of column E in sheet view.

Figure 1(a)

	A	B	C	D	E
1	Invoice				
2				Discount	0.15
3			****	*****	*****
4	Item	Unit Price	Quantity	Cost	Cost Less Discount
5	Paints	3.99	8	=C5*B5	=D5-E2*D5
6	Brush Set	39.95	1	=C6*B6	=D6-E3*D6
7	A4 Pads	7.07	2	=C7*B7	=D7-E4*D7
8					=SUM(E5:E7)

Figure 1(b)

E
0.15

Cost Less Discount
27.132
VALUE!
VALUE!
VALUE!

- (a) The function **TYPE(value)** returns a number indicating the data type of **value**, as follows:

Data Type of value	TYPE(value)
number	1
text	2
logical / boolean	4
error	16
array	64

What number will be returned for the following instances of the TYPE function based on this spreadsheet?

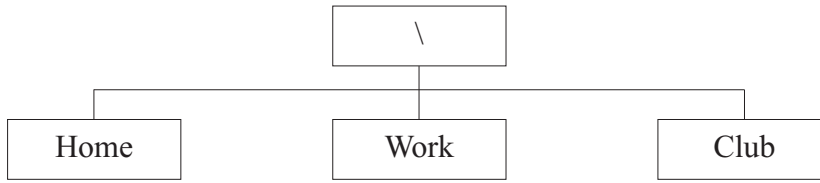
- (i) TYPE(B5) (1 mark)
- (ii) TYPE(E4) (1 mark)
- (iii) TYPE(E7) (1 mark)
- (b) The formula in cell E5 has been replicated into E6 and E7. Why do these cells display #VALUE!?

..... (1 mark)



7 The directory (folder) structure shown in **Figure 2** contains a root (\) and three sub-directories called **Home**, **Work**, and **Club**.

Figure 2



(a) State **two** advantages of using a multi-level directory system.

- 1
 -
 - 2
 -
- (2 marks)*

(b) A file with the name **Budget.xls** is stored in the structure shown in **Figure 2**. What is the pathname for **Budget.xls** if it is stored in the:

(i) root?

-
- (1 mark)*

(ii) sub-directory Club?

-
- (1 mark)*

(c) A directory will hold information about the files stored within it, such as their names and their access rights.

(i) State **three** different file access rights that may be applied to a file such as **Budget.xls**.

- 1
 - 2
 - 3
- (3 marks)*

(ii) Apart from name and access rights, state **three** other properties of a file such as **Budget.xls** that would be stored in the directory.

- 1
 - 2
 - 3
- (3 marks)*

Turn over ►



8 The Data Protection Act was introduced in 1984 in response to a growing level of public concern over the quantity of personal data stored in computer systems. The Act was introduced to protect the individual’s rights to privacy. It was updated in 1998.

Give **one** example of a current or proposed national computer system that could give rise to this concern today. Give **three** reasons why some people are concerned that this system could invade their right to privacy.

System:
(1 mark)

1

.....

2

.....

3

.....

(3 marks)

9 When people who own cats go on holiday, they can leave their cats in a cattery to be looked after. In one such cattery, each cat is assigned its own cage.

The cattery uses a relational database to manage the data about the cats which it looks after.

(a) What is a relational database?

.....

(1 mark)

Cat, **Booking** and **CatOwner** are three of the relations used for this database.

Cat(CatCode, CatName, CatOwnerID, Notes)

Booking(CatCode, DateIn, CageNumber, NumberOfNights)

CatOwner(CatOwnerID, Title, Forename, Surname, Address, PostCode, ContactNumber)

CatCode and **DateIn** form a composite primary key in the relation **Booking**.

(b) (i) What is a composite primary key?

.....

(1 mark)

(ii) Why is a composite primary key needed in the relation **Booking**?

.....

(1 mark)

4



(c) (i) Define the term foreign key.

.....
(1 mark)

(ii) Identify the foreign key in the relation **Cat**.

.....
(1 mark)

(d) Indexes are created in the relation **Cat** on the **CatCode** and **CatOwnerID** attributes.

(i) Why is an index used?

.....
(1 mark)

(ii) Which of the two attribute indices is a secondary index?

.....
(1 mark)

(iii) Explain the disadvantage of having multiple indices.

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

Question 9 continues on the next page

Turn over ►



(e) The following shows parts of these three tables.

Cat Table

CatCode	CatName	CatOwnerID	Notes
...			
C1789	Ginger	O0987	...
C1790	Jerry	O0987	...
C1791	Prickles	O0988	...
C1792	Tabitha	O0989	...
C1793	Squidge	O0990	...
C1794	Jerry	O0990	...

CatOwner Table

CatOwnerID	Title	Forename	Surname	Address	PostCode	ContactNumber
				
O0987	Dr	James	Watson	...	NP123GU	0177654932
O0988	Rev	Phil	Clarke	...	NP157DF	01787254322
O0989	Mrs	Jenny	Murray	...	NP171KL	01797883345
O0990	Mr	Dai	Roberts	...	NP171KL	01797233433
			

Booking Table

CatCode	DateIn	CageNumber	NumberOfNights
...			
C1790	12/01/08	23	14
C1792	12/01/08	12	7
C1789	13/01/08	9	8
C1791	15/01/08	37	15
C1792	12/02/08	12	7
...			

The cat in cage 9 becomes sick, the vet is called and the staff are sufficiently concerned that they decide to contact the owner. Complete the QBE grid to find the name of the cat, its owner's name and the contact telephone number.

Attribute	CageNumber				
Table	Booking				
Criteria					

(4 marks)

END OF QUESTIONS



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