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General Certificate of Education  
 Summer 2002  
 Advanced Subsidiary Examination



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

Thursday 30 May 2002 Afternoon Session

<p><b>In addition to this paper you will require:</b>          a calculator.</p>
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For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
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9			
10			
Total (Column 1)			
Total (Column 2)			
TOTAL			
Examiner's Initials			

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 are expected to use a calculator where appropriate.
- 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.

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

1 Name the most suitable storage medium for each of the following.

(a) Transferring a 40Kb file from one stand-alone computer to another

.....  
(1 mark)

(b) An online database generated and used in the course of a police investigation of a major crime

.....  
(1 mark)

(c) Distributing an electronic copy of an encyclopaedia

.....  
(1 mark)



2 A file of 80 records has the following record structure.

**ProductID, ProductDescription, QuantityInStock**

ProductID is a four-byte integer, ProductDescription is a fifty-six byte fixed length string, QuantityInStock is a four-byte integer.

(a) What is the size of this file in bytes? Show your working.

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

(b) Suggest a suitable primary key for this file. Justify your choice.

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

(c) On closer examination, it is found that 30% of the file storage space is wasted.

(i) Explain why this may occur with the current record structure.

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

(ii) How could the record structure be changed whilst retaining three-fields per record so that this problem is overcome?

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

(iii) Give **one** disadvantage of the restructured solution.

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

7

3 For each of the following name a suitable type of operating system. Give **one** reason for your choice.

(a) A computer system consisting of several desktop PCs sharing each other's files.

Name: .....  
Reason: .....  
.....  
(2 marks)

(b) A computer system dedicated to controlling the flow of chemicals in a chemical processing plant.

Name: .....  
Reason: .....  
.....  
(2 marks)

QUESTION 3 CONTINUES ON THE NEXT PAGE

Turn over ▶

- (c) A computer system dedicated to processing, at the end of each day, a bank’s transactions stored on magnetic disk.

Name: .....

Reason: .....

.....

.....

(2 marks)

6

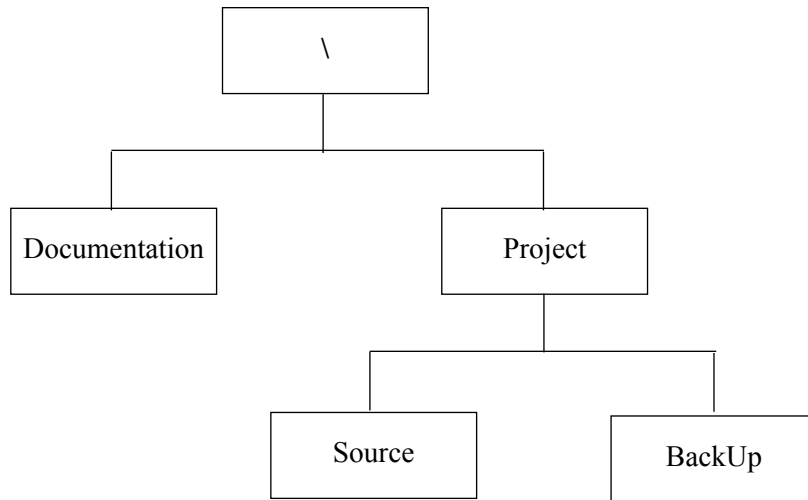
- 4 (a) In the context of file management what is meant by archiving?

.....

.....

(2 marks)

- (b) The directory structure shown in **Figure 1** contains a **root** directory (\) and four sub-directories, named **Documentation**, **Project**, **Source** and **BackUp**. The root directory and its sub-directories are mounted on logical drive **C**:



**Figure 1**

- (i) The sub-directory names **Documentation** and **Project** will be stored in the directory structure. In which part of the directory structure will these names be stored?

.....

(1 mark)

- (ii) Two files each with the filename **Main.Exe** are stored in the system with the directory structure shown in **Figure 1**. The sub-directory **Project** contains one entry for **Main.Exe** and the **BackUp** directory contains another.

What is the pathname for:

- (1) the sub-directory Project's entry for Main.Exe?

.....  
*(1 mark)*

- (2) the sub-directory BackUp's entry for Main.Exe?

.....  
*(1 mark)*

- (c) In addition to file management, name **one** other type of resource managed by an operating system.

.....  
*(1 mark)*

—  
6

- 5** Computer software is now covered by the Copyright, Designs and Patents Act 1988. State **three** provisions of the Act that apply to copyrighted software.

1 .....

.....

2 .....

.....

3 .....

.....

*(3 marks)*

—  
3

6 (a) (i) What is meant by data integrity?

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

*(1 mark)*

(ii) Name **one** technique for ensuring the integrity of data.

.....

*(1 mark)*

(b) (i) What is meant by data security?

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

*(1 mark)*

(ii) Name **one** technique for ensuring the security of data.

.....

*(1 mark)*

—  
4

7 A computer with a high-resolution 19-inch monitor, digitising colour scanner and a printer are used in the development of a school magazine. The application package is also to be used to produce coloured posters whose dimensions are four times the size of the monitor screen.

(a) (i) Name the most suitable **type** of application package to help produce the magazine and posters. (Not a product name.)

.....  
(1 mark)

(ii) State **three** features that make this type of application package useful for the task.

1 .....

.....

2 .....

.....

3 .....

.....  
(3 marks)

(b) Name a suitable **type** of printer for producing 50 coloured copies of the magazine with printing on both sides of the paper.

.....  
(1 mark)

5

**TURN OVER FOR THE NEXT QUESTION**

**Turn over ▶**

- 8 The following is an extract from a spreadsheet that shows how many supermarket loyalty points a customer would earn by spending different amounts of money on supermarket goods. The supermarket is currently operating a bonus scheme which adds a fixed percentage of points to the points earned. The fixed percentage used is 10%.

	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>
1	Bonus %	10		Pounds Spent	Points Earned Without Bonus	Points Earned With Bonus
2	Points earned per pound if £10.00 or less spent	2				
3	Points earned per pound when more than £10 but not more than £30 spent	3				
4	Points earned per pound if more than £30 spent	4				
5				5	10	11
6				15	45	50
7				30	90	99
8				60	240	264
9				90	360	396
:				:	:	:
:				:	:	:
20				240	960	1056
21				270	1080	1188
22				300	1200	1320

- (a) The formula in G5 is  $F5*(1 + \$C\$1/100)$  where \$ denotes absolute cell referencing. What is the formula in cell G8?

.....  
(3 marks)

- (b) The value in cell G6 is calculated from  $45 \times (1 + 10/100)$  which equals 49.5. However, the value displayed in cell G6 is 50. How might this happen?

.....  
(1 mark)

- (c) Write the formula that was entered in F5 and copied to cells F6 to F22. Your formula should perform an automatic recalculation if the value in C2, or the value in C3, or the value in C4, is changed.

.....

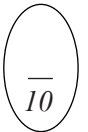
.....

.....

.....

.....

(6 marks)



9 A new copy of a sequentially organised master file is made whenever records are added.

- (a) A program is written to add a single record to this master file. List the processing steps for this program that generate an amended copy of the master file.

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(5 marks)

**QUESTION 9 CONTINUES ON THE NEXT PAGE**

**Turn over ▶**

(b) When many records need to be inserted, these records are stored in a transaction file. The program is modified so that it reads the transaction records from the transaction file.

(i) What file organisation should be used for this transaction file?

.....  
(1 mark)

(ii) In what order should the transaction records be stored in the transaction file? Justify your answer.

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

8

10 A publisher uses a relational database to record details of articles it publishes in a monthly magazine. Two relations (tables) **MagazineEdition** and **MagazineArticle** are used for this database.

**MagazineEdition** (MagazineEditionId, Month, Year)

**MagazineArticle** (ArticleId, ArticleType, ArticleTitle, Content, AuthorName, MagazineEditionId)

Each Article is assigned a unique ArticleId.

(a) What is a relational database?

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

(b) State a suitable primary key for the MagazineEdition relation. Justify your choice.

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

- (c) (i) Explain what is meant by foreign key.

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

- (ii) Name the attribute which is the foreign key in the relation MagazineArticle.

.....  
(1 mark)

- (d) Indexes are created on **ArticleId** and **AuthorName** attributes.

- (i) Why is an index used?

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

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

.....  
(1 mark)

**QUESTION 10 CONTINUES ON THE NEXT PAGE**

**Turn over ▶**

- (e) The following shows a sample of the MagazineEdition table and a sample of the MagazineArticle table.

**MagazineEdition table**

<b>MagazineEditionId</b>	<b>Month</b>	<b>Year</b>
:	:	:
:	:	:
240	December	1999
241	January	2000
242	February	2000
243	March	2000
:	:	:
:	:	:

**MagazineArticle table**

<b>ArticleId</b>	<b>ArticleType</b>	<b>ArticleTitle</b>	<b>Content</b>	<b>AuthorName</b>	<b>Magazine EditionId</b>
1	Business	.....	.....	Bloggs	89
2	Management	.....	.....	Smith	89
3	Business	.....	.....	Bloggs	89
4	Quality Control	.....	.....	Jones	89
5	Investments	.....	.....	Bloggs	90
:	:	:	:	:	:
:	:	:	:	:	:
1201	Recruitment	.....	.....	Jones	253
1202	Accounting	.....	.....	Smith	254
:	:	:	:	:	:
:	:	:	:	:	:

The following shows a Query By Example (QBE) applied to the MagazineEdition and MagazineArticle tables.

MagazineEditionId	AuthorName	ArticleType
	Bloggs	Business

**QBE**

- (i) What will be the minimum number of records returned by this QBE?

.....  
(1 mark)

- (ii) Complete the following QBE to extract the author names and article titles of all articles of the article type "Management" appearing in magazines published in the year 1999 or before.


(4 marks)

**END OF QUESTIONS**

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