

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Education
 June 2008
 Advanced Level Examination



COMPUTING
Unit 5 Advanced Systems Development

CPT5

Thursday 5 June 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 black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. **Answers written in margins or on blank pages will not be marked.**
- 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.

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



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

1 The council of a large city wants to reduce the number of cars owned by the city’s residents. The council is planning to introduce a car share club. The club will own cars, which will be parked in designated parking areas across the city when not hired out. The club members will be able to hire a car via the Internet, by e-mail or by phone. Members can book a car for one or more hours, or one or more days, up to a maximum of three weeks. Members pay a fixed monthly membership fee. They are also billed for the amount of time the car is hired plus a mileage charge. If a member returns a car late to the designated parking area, there will be a penalty charge for each additional hour.

Each car has a built-in computer with mobile phone technology to provide a communication link to the booking centre. Each member will receive a membership card which contains an RFID (Radio Frequency Identification) tag and the member is issued with a PIN (Personal ID Number).

1 (a) Explain how the membership card could be used so only members who have booked a particular car can unlock and use the car.

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

(3 marks)

1 (b) When a resident of the town wants to join the car share club, they are required to provide the following details:

- Credit card number
- Full Name and Address (as registered against their credit card)
- Driving Licence Number
- E-mail address
- Mobile telephone number

The monthly fee plus hire charges are automatically added to the member’s credit card. A statement of charges is available for the member to download from the Internet.

1 (b) (i) What other details are required to be stored about the member so that the member can only access their own statement of charges?

.....
(2 marks)



The details held about each Parking Area are:

- A 3-character unique Location Code
- Name of Parking Area, such as "Station"
- Post Code of Parking Area

The details held about each car are:

- Car Registration Number
- Designated Parking Area

At the time of booking, the member will be asked to provide the following details:

- Member ID
- Pick-up point (from which parking area)
- Hire start date and time
- Hire end date and time

The booking centre allocates a car from the chosen parking area to the member and issues the member with a booking reference code.

Choosing suitable attribute identifiers, complete the relations making sure that the primary key attribute(s) are underlined.

1 (b) (ii) Member (.....

)
 (1 mark)

1 (b) (iii) ParkingArea (.....
)
 (1 mark)

1 (b) (iv) Car (.....
)
 (1 mark)

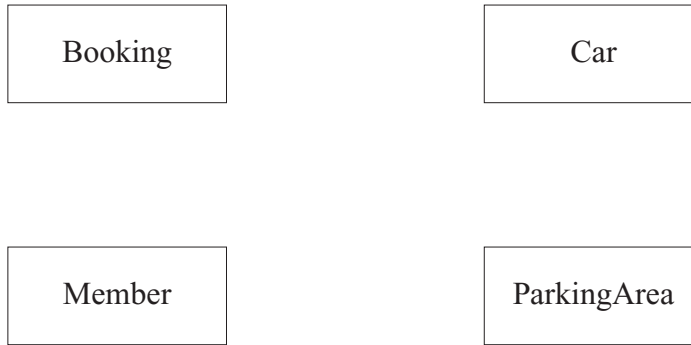
1 (b) (v) Booking (.....
)
 (3 marks)

Question 1 continues on the next page

Turn over ►



1 (c) Complete the entity-relationship diagram for the entities below:



(3 marks)

1 (d) Using SQL commands SELECT, FROM, WHERE, ORDER BY, write an SQL statement to query the database tables to produce a list of bookings for the month of December 2007. The results of the query are to be in member ID order.

.....

.....

.....

.....

(4 marks)

1 (e) A programmer is asked to write a routine CalcHireFee (StartDateTime, EndDateTIme, Mileage, OverdueHours) to calculate the hire fee for a booking. EndDateTIme is the pre-arranged hire end date and time. If the car is returned after that time, the late hours are counted to the next whole hour as OverdueHours. Each row of the table contains a set of values to be used to test the routine CalcHireFee. For each row, **tick** the relevant column (one column only) to show whether it is normal, erroneous or boundary data. **Circle** the values you regard as boundary or erroneous values.

StartDateTime	EndDateTIme	Mileage	OverdueHours	Normal	Erroneous	Boundary
01/12/07 06:00	01/12/07 15:30	15	2			
06/12/07 18:00	12/12/07 09:00	237	3			
04/12/07 23:00	04/12/07 08:30	5	2			
03/12/07 08:00	03/12/07 09:00	0	0			
01/12/07 06:00	01/12/07 15:30	0	1.5			
01/12/07 06:00	01/12/07 15:30	0	-2			
04/12/07 08:30	05/12/07 23:00	57	0			
01/12/07 06:00	01/12/07 15:30	15	3			

(6 marks)



2 SSL (Secure Socket Layer) is a protocol used by Internet browsers to transmit information securely. It uses a combination of *Symmetric Key* and *Public Key encryption*.

2 (a) (i) What is encryption?

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

2 (a) (ii) Explain the difference between Symmetric Key and Public Key encryption.

.....
.....
.....
(3 marks)

2 (b) Amy uses her computer for online banking. When she logs on to her bank’s website, her computer (computer A) and the bank’s server (computer B) start a secure session using SSL. Computer B sends a symmetric key to computer A to encrypt all the personal data that is passed between the computers. This symmetric key is discarded at the end of the session.

2 (b) (i) When and how is the Public Key encryption used in this session?

.....
.....
.....
(3 marks)

2 (b) (ii) Why is the symmetric key encryption on its own not enough to protect the personal data during transmission between computer A and computer B?

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

8

3 State **three** reasons why a software system will require maintenance.

1
.....
2
.....
3
.....
(3 marks)

3

Turn over ►



4 (a) What is an Expert System?

.....
.....

(2 marks)

4 (b) Give **one** situation where an expert system might be used.

.....

(1 mark)

4 (c) Give the **three** constituent parts of an expert system.

1

.....

2

.....

3

.....

(3 marks)

4 (d) Users of expert systems claim that they are much more useful than a very large database. Give **two** reasons to justify this claim.

1

.....

2

.....

(2 marks)

8

5 It is often said that correcting faults gets more and more expensive as the development cycle proceeds. Early detection of faults is therefore very important. Name **three** different types of testing that could be used in the **early** stages of software development.

1

2

3

(3 marks)

3



6 (a) Distinguish between a database and a Database Management System (DBMS).

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

(2 marks)

6 (b) Name the **three** levels of a DBMS.

1
2
3

(3 marks)

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

.....

(1 mark)

7 A student has word-processed the first draft of his essay and printed a copy. He then lost the file into which he saved the essay. He is about to spend time typing the essay again. You suggest he should scan the printed copy instead.

7 (a) Explain the sequence of steps the **scanner** goes through when it scans the printed document to produce an image of the document.

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

(4 marks)

7 (b) What software is required to convert the scanned image into wordprocessor useable text?

.....

(1 mark)

Turn over for the next question

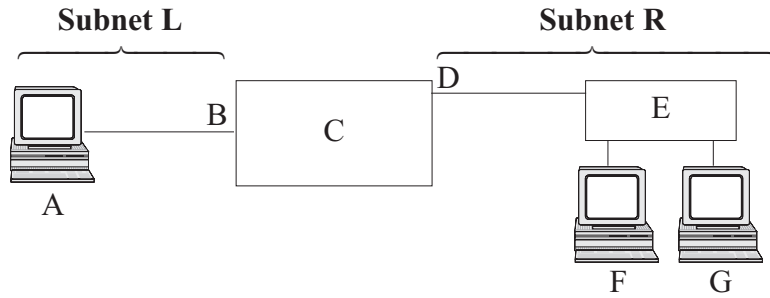
Turn over ►

6

5



8 The diagram shows a Local Area Network consisting of two subnets. A, F and G are desktop PCs.



8 (a) (i) Name the networking devices labelled C and E.

C

E

(2 marks)

8 (a) (ii) If the network ID of subnet L is 192.168.7 and the network ID of subnet R is 192.168.8, what are the IP addresses at ports B and D?

B

D

(1 mark)

8 (a) (iii) What would be a suitable subnet mask for this network?

.....

(1 mark)

8 (a) (iv) Give a suitable IP address for the desktop PC labelled G.

.....

(1 mark)

8 (b) (i) How many different host IDs does subnet L support?

.....

(1 mark)

8 (b) (ii) Explain your answer.

.....

.....

.....

(2 marks)

END OF QUESTIONS

