

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education
 June 2006
 Advanced Level Examination



COMPUTING
Unit 5 Advanced Systems Development

CPT5

Tuesday 20 June 2006 9.00 am to 10.30 am

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 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. Quality of Written Communication will be assessed in all answers.

For Examiner's Use			
Number	Mark	Number	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 A hospital uses a multi-user centralised database stored on a database server to allow staff to access patient data.

(a) Explain the concurrent update problem which could arise with this multi-user database.

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(2 marks)

(b) Explain how a DBMS (Database Management System) overcomes the concurrent update problem.

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(2 marks)

(c) Explain client-server operation for this database server.

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(1 mark)

5

2 What is meant by an object-oriented database?

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(1 mark)

1

3 A snack dispensing machine is being designed which will give change when a customer inserts more money than the cost of the snack chosen.
 The machine only accepts £2, £1, 50p, 20p, 10p and 5p coins.
 All snacks cost a multiple of 5p.
 The machine should give the change in as few coins as possible.
 A programmer is asked to write a routine CalculateCoinage (Change). The routine will take, as a parameter, the amount of change to be returned. The routine will then calculate how many of each coin are required.
 Choose **three** suitable sets of test data for the parameter Change, which adequately test the functionality of this routine. Justify your choice in each case.

- 1
-
- 2
-
- 3
-

(6 marks)

6

4 State **two** reasons why a software system will require maintenance.

- 1
-
- 2
-

(2 marks)

2

Turn over for the next question

5 A computer technician in a school is asked to keep up-to-date details of the hardware equipment the school owns (known as an inventory). The school management require the following details to be stored for each item of hardware:

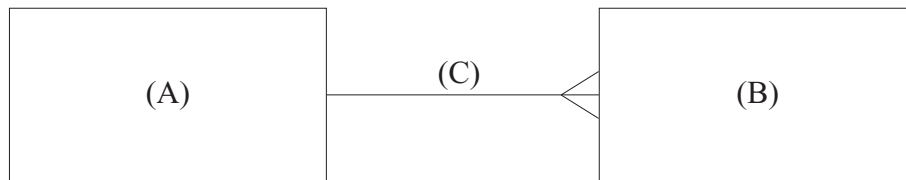
- description
- make
- model
- inventory reference number (20 alphanumeric characters)
- date of purchase
- purchase price
- room where item is kept.

If an item is loaned, the following details must be stored:

- location details of where the item will be located
- the initials of the person responsible for its return
- the dates of removal and return.

(a) The two entities **HardwareItem** and **EquipmentLoan** have been identified.

(i) Complete the diagram below.



A

B

C

(2 marks)

(ii) Name this type of diagram.

.....

(1 mark)

6 A large car rental company, ACME Cars, wants to reduce the time it takes to check in rental cars being returned by customers.

(a) Name and briefly describe **two** fact-finding techniques a systems analyst might use in this context.

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2

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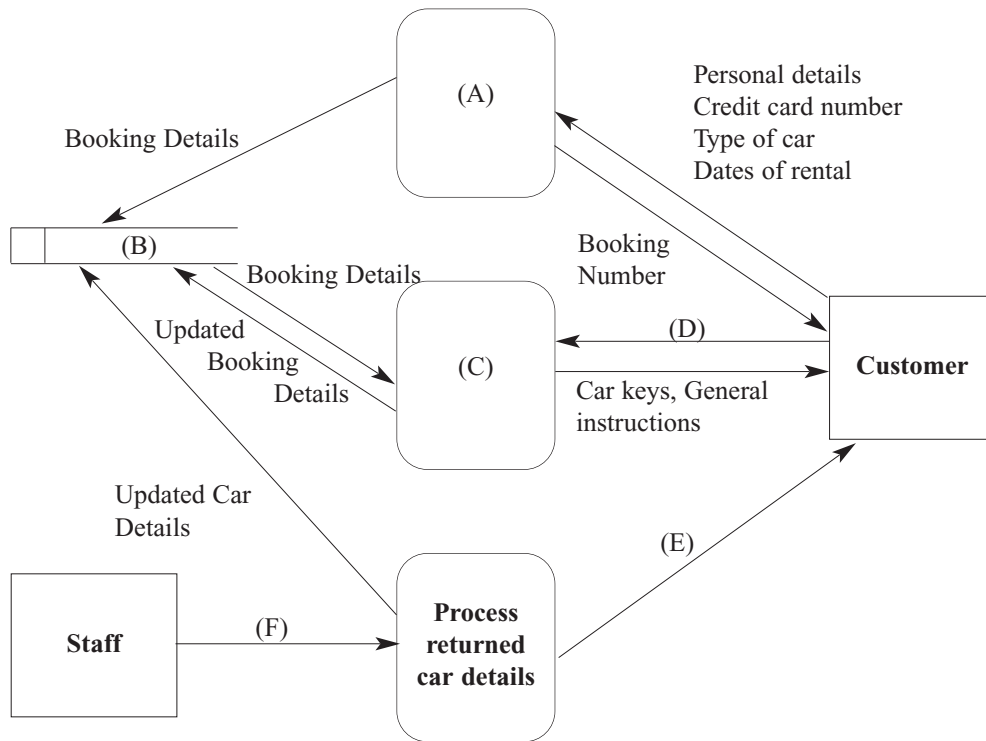
.....

(2 marks)

(b) The systems analyst finds the current system operates as follows.

- Customers **book a car** on the Internet using active server pages which update the **car database**. The customer guarantees their booking with a credit card number and is given a **booking number**.
- Customers provide the **booking number** and a **valid driving licence** when they **collect a car**.
- ACME staff check that the details match with the booking and issue **car keys** and **general instructions**.
- When a rental car is returned it must be inspected by a member of staff to check **mileage, fuel level** and the **condition** of the car.
- At the check-in desk, the customer is issued with an invoice.

(i) Complete the diagram below:



- A
 - B
 - C
 - D
 - E
 - F
- (6 marks)*

(ii) Name this type of diagram.

.....
(1 mark)

Question 6 continues on the next page

(c) To design the system that would reduce the time of rental car returns, the system designer is proposing that ACME staff use a hand-held device to inspect a returned rental car and process the transaction, so that the customer does not have to return to the check-in desk. The hand-held device will need to have certain features. A possible list is:

- barcode reader
- smart card reader/writer
- thermal printer
- wireless network card
- touch sensitive screen
- RFID (Radio Frequency Identification) tag reader
- Optical Character Reader
- bluetooth enabled

Name **four** features you think are needed and explain how they would be used to complete the check-in process between the ACME staff and the customer. Your chosen features should cover input, output and transmission of data.

1

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2

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3

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4

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(4 marks)

8 A school has classrooms and offices in several buildings on a single site. Data held about the pupils is stored on a database and administered by a database administrator. The school now wants to connect all its office and classroom computers to share information and services and introduce an electronic registration system.

(a) Which network type is most appropriate, wide area (WAN) or local area (LAN)? Justify your choice.

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(2 marks)

(b) Explain **one** way in which the school network can benefit each of the following. Each must be different.

(i) A pupil

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

(ii) A teacher

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

(iii) A head of year or personal tutor

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

(iv) The head or principal of the school

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

- (c) The computers in each room are to be connected using an Ethernet-based hub. In one of the buildings three offices are next to each other, each with five computers. Draw a diagram of the physical topology of this network.

(3 marks)

- (d) When the network installation is complete, pupils and staff complain that the network is very slow during peak periods.

- (i) It is suggested that the hubs should be replaced by switches. What is the difference between a switch and a hub?

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(2 marks)

- (ii) Why does this improve the speed of the transmissions on the network?

.....

(1 mark)

- (e) Why is a firewall needed if the school wants to connect to the Internet?

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(2 marks)

There are no questions printed on this page