

**ADVANCED GCE UNIT
COMPUTING**

Integrated Information Systems

WEDNESDAY 24 JANUARY 2007

2511

Morning

Time: 1 hour 30 minutes



Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- If you run out of space for an answer, continue on the spare pages at the back of the booklet.
- If you use these spare pages, you must write the question number next to your answer. You can also use the spare pages for rough work.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is 90 (86 + 4 written communication).
- You will be awarded marks for the quality of written communication where an answer requires a piece of extend writing.
- No marks will be awarded for using brand names of software packages or hardware.

| For Examiner's Use | | |
|--------------------|-----------|------|
| Question no. | Max. Mark | Mark |
| 1 | 17 | |
| 2 | 5 | |
| 3 | 9 | |
| 4 | 32 | |
| 5 | 14 | |
| 6 | 9 | |
| WC | 4 | |
| Total | 90 | |

This document consists of **13** printed pages and **3** lined pages.

The National Lift Co is a medium sized company that manufactures lifts for all types of property. The company is based in the UK on a single site. The Administration Department is situated on a single floor and has a bus network. The Design and Manufacturing Department is situated on two floors and has a star network.

- 1 (a) Draw a labelled diagram of a bus network and give a reason for it being appropriate in this case.

Reason
.....[5]

- (b) Draw a labelled diagram of a star network that uses a switch and give a reason for this type of network being appropriate in this case.

Reason
.....[4]

(c) Explain the difference between a hub and a switch when used in a star network.

.....
.....
.....
.....[2]

(d) (i) Draw a diagram to show how a bridge may be used to join the two networks.

[2]

(ii) Explain how a bridge deals with a message sent from one computer to another. The computers may be on the same or different networks.

.....
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.....
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.....
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.....
.....
.....[4]

3 The Company uses many parts from many suppliers to build lifts. This is shown in the entity model below.



(a) Explain why this model is **not** suitable for implementing a relational database in 3rd Normal Form.

.....
.....[1]

(b) (i) Redraw this model so that it can be used to create a relational database in 3rd Normal Form.

[4]

(ii) Explain the use of primary and foreign keys to link tables in your solution to (b)(i).

.....
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.....
.....
.....[4]

4 When an order for a lift is received, a design is produced. A simulation of the design is then modelled on a computer.

(a) State an input, the processing and an output that should be used in the simulation.

Input

.....

Processing

.....

Output

.....[3]

(b) Explain how inputs and outputs can be simulated on a computer.

.....

.....

.....

.....

.....

.....

.....

.....[3]

(c) Explain why simulation would be appropriate in this case.

.....

.....

.....

.....

.....[2]

(d) State **two** difficulties of simulating a lift for a 40 storey office block.

1

.....

2

.....[2]

The simulation is written in a high-level language.

- (e) (i) Explain why the simulation program is written in a high-level language rather than a low-level language.

.....
.....
.....
.....[2]

- (ii) Explain why the programmers would use a dynamic data structure for the simulation.

.....
.....
.....
.....[2]

- (iii) Draw a diagram of a linked list and explain how it can be used in this simulation.

[3]

Explanation

.....
.....
.....[2]

(f) In the high-level language used to create the simulation, a variable of type integer is defined as

intVariable ::= <intLetter> <%> | <intLetter> <string> <%>

intLetter ::= I | J | K | L | M | N

string ::= <letter> | <string><letter>

letter ::= A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z

(i) State whether or not the following are valid integer variables. In each case give a reason for your answer.

%IN

Reason

.....

.....

I2N%

Reason

.....

.....

in%

Reason

.....

.....

INTO

Reason

.....

.....[8]

5 The National Lift Co has been taken over by a multinational company. This company has offices and factories throughout the world.

It is proposed that any design may be used worldwide.

(a) (i) Explain why it is **not** appropriate to use 56K modems to transfer designs between factories.

.....
.....
.....
.....[2]

(ii) Give a more suitable method.

.....
.....[1]

(b) (i) State the meaning of the term protocol.

.....
.....[1]

(ii) State why standard protocols should be used when transferring designs between factories.

.....
.....[1]

(c) Name and describe **one** method of checking data when it is transferred from one factory to another.

Name

Description

.....
.....
.....
.....[3]

(d) Data are valuable assets of the company.

Describe the use of encryption, authorisation and authentication when transferring information across the world.

Encryption

.....

.....

.....

Authorisation

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.....

.....

Authentication

.....

.....

..... [6]

PLEASE TURN OVER FOR THE LAST QUESTION

6 The original national company had a centralised database and the new company uses a distributed database.

(a) Describe the meaning of the terms centralised database and distributed database.

Centralised database
.....[1]

Distributed database
.....
.....
.....[2]

(b) In order to keep all employees, throughout the world, up to date, the company uses email.

State **six** features of email that are useful to the company.

- 1
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- 2
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- 3
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- 4
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- 5
.....
- 6
.....[6]

A series of 28 horizontal dotted lines spanning the width of the page, providing a guide for handwriting practice.

A series of 25 horizontal dotted lines spanning the width of the page, providing a template for handwriting practice.

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