COMPUTER STUDIES

Paper 1

0420/01

October/November 2006

2 hour 30 minutes

Candidates answer on the Question Paper.
No Additional Materials required.

Candidate Name	

Centre Number						Candidate Number				

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen.

You may use a pencil for any diagrams, graphs or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN THE BARCODE.

DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

Answer **all** questions.

No marks will be awarded for using brand names of software packages or hardware.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use

This document consists of **18** printed pages and **2** blank pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 Explain, using examples where appropriate, the following computer terms:

(a) verification ....

....

.... [2]

(b) video-conferencing ....

....

.... [2]

(c) handshaking ....

....

.... [2]

(d) simulation ....

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.... [2]

(e) batch processing ....

....

.... [2]

2 Name **two** devices used for direct data capture. Give **one** application for each device named.

Device 1 ....

....

....

Application 1 ....

....

....

Device 2 ....

....

....

Application 2 ....

....

....[4]

3 (a) Give **two** examples of computer crime.

1 ....

....

2 ....

....[2]

(b) Describe **two** methods used to prevent computer crime.

1 ....

....

2 ....

....[2]

4 State **three** effects on society due to the increase of businesses using e-commerce.

1 ....

....

2 ....

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3 ....

....[3]

5 State **two** examples of the use of computer software when making films for television and cinema.

1 ....

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2 ....

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....[2]

6 When developing a new computer system, state **four** tasks performed in the design stage.

1 ....

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2 ....

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3 ....

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4 ....

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.... [4]

7 (a) Describe how a scientist might use an expert system to help identify mineral deposits.

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....

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.... [3]

(b) Give another example of an area where an expert system could be used.

....

.... [1]

8 An international company has changed from a manual filing system to a computer-based system.

(a) When compared with the manual filing system, state **two** benefits to the company of using the computer-based system.

1 ....

....

2 ....

.... [2]

(b) State **two** effects on the staff due to the introduction of a computer-based system.

1 ....

....

2 ....

.... [2]

(c) (i) Give **one** reason why the company used parallel running as the method of changing from the manual system to the computer-based system.

....

....

.... [1]

(ii) Give **one** example of an application for which parallel running would not be a suitable method of changeover.

....

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.... [1]

9 A computer program is required which inputs 10 numbers, multiplies them together and finally outputs the answer (the product). The following algorithm has been written to do this.

```
1    count = 0
2    product = 0
3    while count <= 10 do
4        input number
5        product = product * number
6        count = count + 1
7        print product
8    endwhile
```

(a) There are **three** errors in the algorithm. Locate and describe these errors.

1 ....

....

....

2 ....

....

....

3 ....

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....[3]

(b) A **while … do** loop has been used in the algorithm. State another type of loop that could have been used.

....

....

....[1]

10 A robot arm is to be used to move some objects which are positioned on the grid shown. Object "X" is located at A7 and is to be moved to F7. Object "Y" is located at C6 and is to be moved to G5.

The START position for the robot arm is shown. The robot arm can travel left and right along the top of the grid, and the robot arm can extend (lengthen) and retract (shorten) so that the gripper at the end of the arm can reach any grid square.

The robot arm can only travel left and right along the top of the grid

start

The robot arm can extend or retract
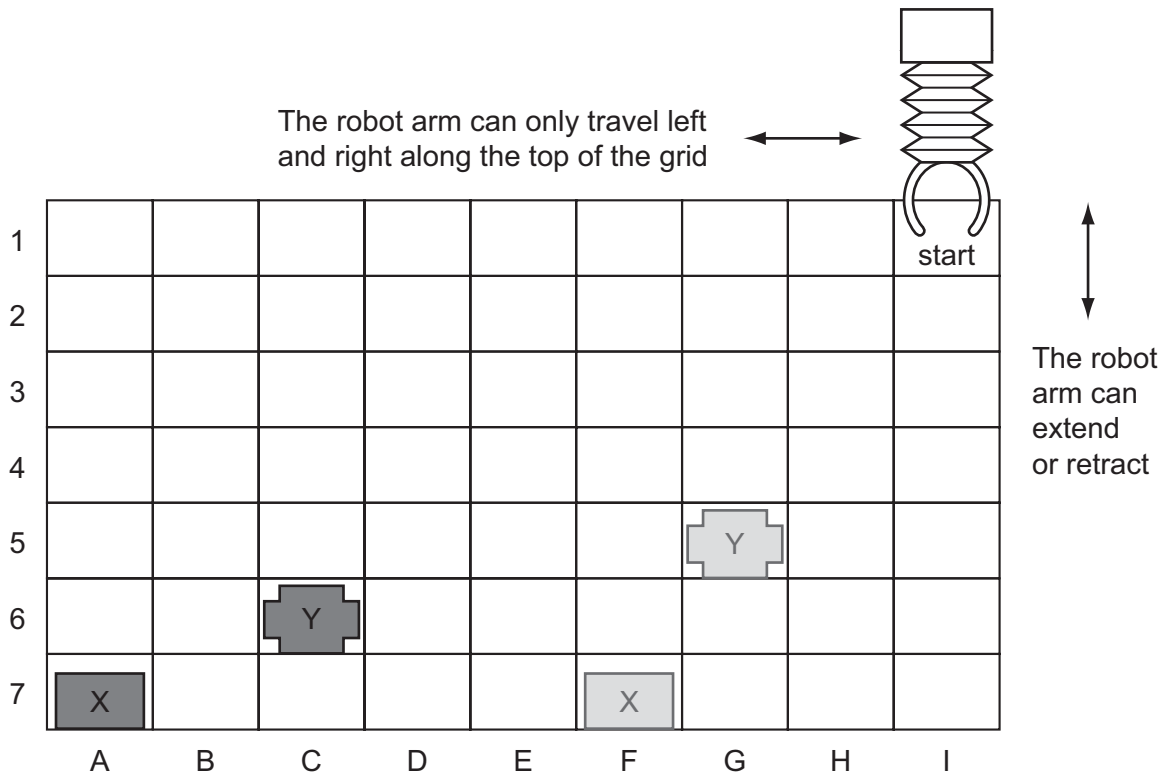
The following commands must be used:

Instructions for Robot Arm	
Right *n*	Moves *n* squares to the right
Left *n*	Moves *n* squares to the left

Instructions for Robot Arm	
Down *n*	Moves *n* squares down (extend)
Up *n*	Moves *n* squares up (retract)
Close	Closes the gripper
Open	Opens the gripper

For example, to move block "X" from square A7 to F7 (beginning at START) would require
the following instructions:

Left 8
Down 6
Close
Up 6
Right 5
Down 6
Open

Write a set of instructions to transfer block "Y" from C6 to G5 (beginning at START).

....

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....[3]

11 A school keeps a spreadsheet of examination results in four subjects. Part of the spreadsheet is shown below.

	A	B	C	D	E	F	G	H
1	Name	Class	Maths	Science	IT	English	Average Mark	Pass/ Fail
2	Allen	11A	33	24	19	44	30	
3	Dyos	11B	41	54	70	31	49	
4	Kegg	11A	82	69	57	52	65	
5	Khan	11C	44	21	50	85	50	
6	Kolacz	11A	73	51	73	51	62	
7	Lenski	11B	17	41	40	34	33	
8	Peruza	11C	87	72	64	61	71	

(a) Which column has been used to sort the data?

[1]

(b) What formula has been entered in cell G2 to calculate Allen's average mark?

[1]

(c) The IT results need to be sorted so that the highest mark is at the top. Describe how this sort could be done.

[2]

(d) The formula **IF(G5 > 45, "PASS", "FAIL")** is entered in cell H5. What output appears?

[1]

(e) State the validation check that should be carried out on data entered in cells C2 to F8 to ensure values over 100 are not input.

[1]

(f) The school has kept the spreadsheets of all the examination results for the last five years. What feature of the spreadsheet software would allow the results to be easily compared?

[1]

12 An airport has multimedia kiosks linked to a central computer.

(a) State **two** input devices, other than a keyboard, which might be used at the multimedia kiosks.

1 ....

2 .... [2]

(b) Give **two** items of information that might be accessed from multimedia kiosks.

1 ....

2 .... [2]

(c) State **one** advantage and **one** disadvantage for the airport of providing multimedia kiosks.

Advantage ....

....

Disadvantage ....

.... [2]

13 Virtual reality is used in the designing of chemical plants.

(a) What is meant by virtual reality?

....

....

....[2]

(b) Give **two** examples of the special hardware needed to interact with a virtual reality system.

1 ....

....

2 ....

....[2]

(c) Give **two** advantages of using virtual reality.

1 ....

....

....

2 ....

....

....[2]

(d) Give another example of an application which uses virtual reality.

....

....[1]

14 Give **three** benefits of using top-down design to write computer programs.

1 ....

....

2 ....

....

3 ....

.... [3]

15 In a school, students can use laptop computers which link to the school's wireless network.

(a) State **two** advantages to students of using this system rather than desktop computers located in specialist computer laboratories.

1 ....

....

....

2 ....

....

.... [2]

(b) Give **two** disadvantages of using laptop computers rather than using desktop computers.

1 ....

....

....

2 ....

....

.... [2]

16 A company provides on-line training courses.

(a) Give **one** use for each of the following to help the company run these courses:

(i) spreadsheet package ....

....

....

(ii) database package ....

....

....

(iii) desk top publishing package ....

....

....

(iv) authoring package ....

....

....[4]

(b) A leaflet designed using word processing software to advertise a course is currently too
big to fit on a single printed page. What features of the word processing software could
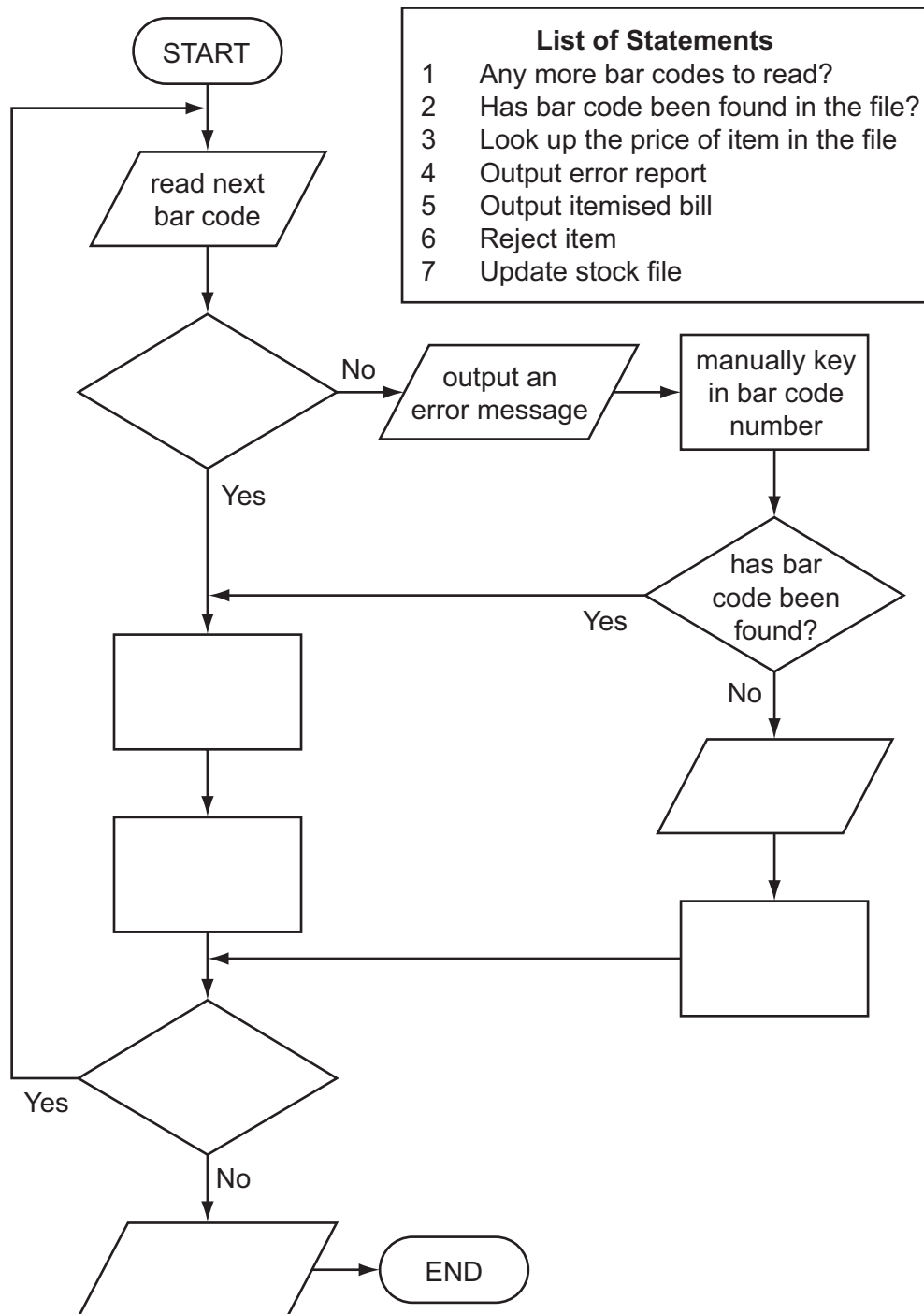be used to alter the design so that it does fit on one page?

1..

....

....

2..

....

....[2]

17 The following flowchart shows how the bar code written on an item is used to find the price, do stock control and produce an itemised bill. Select statements from the list below to complete the flowchart.

```
              START

                │
                ▼
          ┌─────────────┐
          / read next    /
         /  bar code    /
          └─────────────┘
                │
                ▼
            ◇ ────── No ──→  / output an  /  ──→  ┌──────────────┐
           ◇ ◇              / error message/       │ manually key │
            ◇                                       │ in bar code  │
             │                                      │   number     │
            Yes                                     └──────────────┘
             │                                             │
             │                                             ▼
             │                                          ◇ has bar ◇
             │        ←──────── Yes ──────────────────  ◇ code been ◇
             ▼                                          ◇  found?  ◇
        ┌─────────┐                                        │
        │         │                                       No
        │         │                                        │
        └─────────┘                                        ▼
             │                                        / ........ /
             ▼                                             │
        ┌─────────┐                                        ▼
        │         │                                   ┌─────────┐
        │         │                                   │         │
        └─────────┘        ←──────────────────────    │         │
             │                                         └─────────┘
             ▼
          ◇     ◇
   Yes ──◇       ◇
          ◇     ◇
             │
            No
             │
             ▼
        / ........ / ──→  END
```

List of Statements
1. Any more bar codes to read?
2. Has bar code been found in the file?
3. Look up the price of item in the file
4. Output error report
5. Output itemised bill
6. Reject item
7. Update stock file

[5]

18 A car dealer uses a database to keep details of cars in stock. Part of the stock file is shown below.

RegNo	Make	Model	Colour	Doors	Engine(cc)	Price($)
AT 15 APC	Renault	Laguna	Black	5	1600	5800
NX 21 TPQ	Opel	Corsa	Green	3	1400	2000
WS 46 ART	VW	Golf	Blue	3	1600	3400
RP 09 NTR	VW	Golf	Red	5	2000	6350
VV 81 KKT	Proton	Wira	White	4	1300	2200
NK 55 ARM	VW	Golf	White	3	1800	4100

(a) (i) State the fieldname that should be used as the key field.

....

(ii) Explain the purpose of a key field.

....

.... [2]

(b) The following search condition is input:

(**Price**($) < 5000) AND (**Model** = Golf)

Write down the records that match the above search condition using only **RegNo**.

....

....

.... [2]

(c) Write down a search condition to find cars with an Engine greater than 1400cc or which have less than 5 Doors.

....

.... [2]

(d) When a car is sold, the sale needs to be linked to a customer file. Suggest a new field which could be used to link the stock file to the customer file.

....

.... [1]

19 A computer is used to control the traffic lights at each end of a narrow bridge.
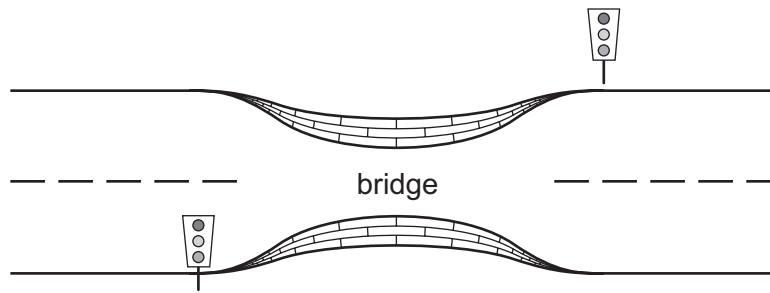
(a) State **one** type of sensor that could be used to detect a vehicle approaching the bridge.

....

.... [1]

(b) Give **one** reason why an analogue to digital converter (ADC) may be needed.

....

.... [1]

(c) Describe how the data received from the sensors is used to control the timing of the traffic lights.

....

....

....

....

.... [3]

(d) If the computer controlling the traffic light system detects an error in the system, or fails completely, what should the lights on the bridge do?

....

....

.... [1]

20 Temperatures (°C) are being collected in an experiment every hour over a 200 hour period. Write an algorithm, using pseudocode or otherwise, which inputs each temperature and outputs

- how many of the temperatures were **above** 20 °C
- how many of the temperatures were **below** 10 °C
- the lowest temperature that was input

[5]

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