UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

COMPUTER STUDIES   **7010/11**

Paper 1   **May/June 2013**

2 hours 30 minutes

Candidates answer on the Question Paper.

No Additional Materials are required.

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 soft pencil for any diagrams, graphs or rough working.

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

DO **NOT** WRITE IN ANY BARCODES.

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 **20** printed pages.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 Name a suitable sensor for **each** of the following applications.
Choose a **different** sensor in each application.

    (i) control of a central heating system

    ....

    (ii) operation of automatic doors

    ....

    (iii) detection of intruders

    ....

    (iv) monitoring of a greenhouse environment

    .... [4]

2 Name **two** different types of loop structure in a typical programming language.

Give an example of how ten numbers could be input using the named loop.

Name of type of loop structure ....

Example ....

....

....

....

Name of type of loop structure ....

Example ....

....

....

....

.... [6]

3

3 **(a)** Which of the following activities should **always** be regarded as security risks to computer systems?
Indicate by ticking (✓) the **Yes** or **No** column.

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Activity	Yes	No
chat rooms		
cookies		
pharming		
virus		
VoIP		

[2]

(b) State what is meant by the **five** computer terms in the table.

chat rooms ....
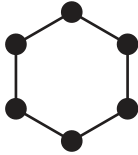
....

....

cookies ....

....

....

pharming ....

....

....

virus ....

....

....

VoIP ....

....

.... [5]

4 **(a)** Name the following types of network topologies:

(i) **(ii)**
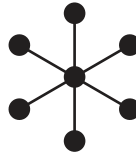
.... [2]

(b) Give **one** benefit and **one** drawback of networking computers.

Benefit ....

....

....

Drawback ....

....

.... [2]

(c) Many networks are known as LAN or WAN.

Give **one** feature of **each** type of network.

LAN ....

....

WAN ....

....

.... [2]

5 Name a suitable hardware device to enable automatic data capture in each of the following applications. Each device must be different.

Application	Hardware device
automatic stock control system in a supermarket	
keeping track of the livestock on a large farm	
input data into a computer using speech recognition	

[3]

6 Animation using computer systems involves many stages. The diagram below shows a number of descriptions and terms used in computer animation.

By drawing arrows, connect the correct description to the animation term.

generating intermediate frames between two images to give the appearance of movement	morphing
special effect that changes one image into another image (for example, the special effect of a person slowly turning into an animal)	rendering
generating a final completed 3D image from a given 2D model by the use of software	tweening
very simple drawing made up of lines, circles and dots used to depict a character (for example, a human being)	key frames
a variable controlling the position of part of an animated character (for example, to control the changes in a facial expression)	stick figure
drawings that define the starting point and end point of any smooth transition in animation	avar

[5]

7 Which **five** computer terms are being described below?

(i) typing in the same data twice and the computer checks both sets of data to see if they exactly match

....

(ii) signal sent from a printer requesting attention from the processor; this causes a temporary break in the execution of whatever the processor is doing

....

(iii) exchange of signals between two devices to ensure synchronisation when communication starts

....

(iv) temporary storage area in a printer that holds data waiting to be printed

....

(v) count of the number of bits before transmission which is sent with the transmission so that the receiver can check to see whether the same number of bits have arrived

.... [5]

8 A company has set up a website to advertise and show houses for sale.

A customer can get access to an online interactive map and can also take a tour around the house.

(a) Describe **three** features you would expect to see on an interactive map.

1 ....

....

....

2 ....

....

....

3 ....

....

.... [3]

(b) (i) Name the type of computer technology that enables a tour of the house to take place using a website.

.... [1]

(ii) What **three** features would you expect to see on the website which allows a customer to take this tour?

1 ....

....

2 ....

....

3 ....

.... [3]

9 An expert system has been set up to help diagnose faults in car engine management systems.

(a) One component is an interactive user interface.

Name **three** other components in a typical expert system.

1 ....

....

2 ....

....

3 ....

.... [3]

(b) Identify **two** of the features you would expect to see in a typical interactive user interface supplied with an expert system.
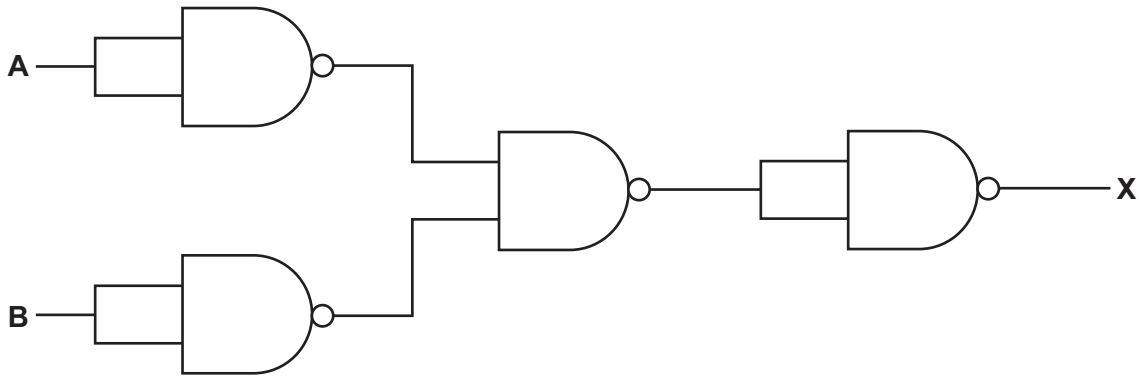
1 ....

....

....

2 ....

....

.... [2]

10 (a) (i) Complete the truth table for the logic circuit which is made up of **NAND** gates only.

A	B	Working space	X
0	0		
0	1		
1	0		
1	1		

[2]

(ii) What single logic gate has the same function as the above logic circuit?

.... [1]

(b) (i) Complete the truth table for the logic circuit.
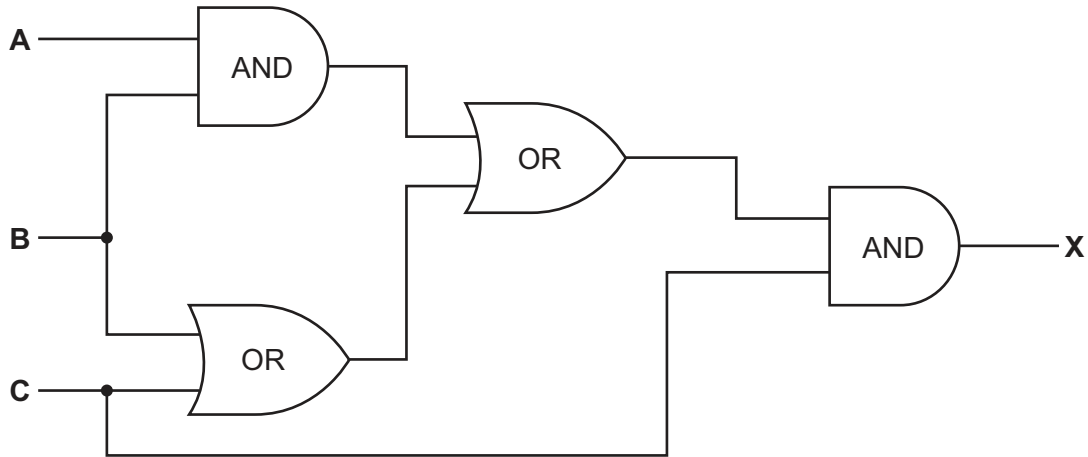
A	B	C	Working space	X
0	0	0		0
0	0	1		1
0	1	0		0
0	1	1		1
1	0	0		0
1	0	1		1
1	1	0		0
1	1	1		1

[4]

(ii) What could replace the whole logic circuit?

.... [1]

11 Letters from the Greek alphabet are to be transferred to a computer system. Each letter can be represented on an 8 by 8 grid. Each column has a value from 1 to 128.

The value of each row is stored in a table. The values in the column headings are used to work out the value for each row (e.g. in our example, row 8 has the value 64 + 32 + 4 + 2 = 102).

Thus, in the example below, the letter (π) is stored as:

128 64 32 16 8 4 2 1

row	value
1	255
2	255
3	102
4	102
5	102
6	102
7	102
8	102

(a) What values would be stored in the table for the Greek character (Σ)?

128 64 32 16 8 4 2 1

row	value
1	
2	
3	
4	
5	
6	
7	
8	

[4]

(b) Draw the character formed from the following value table:

row	value
1	146
2	146
3	84
4	84
5	56
6	16
7	16
8	16

128 64 32 16 8 4 2 1

[4]

12 A database was set up to compare oil companies. A section of the database is shown below:

Code	Name of company	No of employees	No of countries	Head office	Profits (billion $)	Share price ($)
AR	Arrows	60 000	30	Americas	8.0	39.00
GZ	Gazjeti	35 000	4	Asia	5.0	44.50
KO	Konoco	40 000	22	Americas	10.0	18.55
OS	Oilbras	56 000	11	Americas	4.0	59.60
SD	Sand Oil	102 000	51	Europe	12.0	15.30
SN	Southern Oil	50 000	15	Americas	11.0	10.90
ST	Static Oil	80 000	31	Americas	10.0	52.05
SU	Summation	70 000	40	Europe	9.0	30.40
WP	Wasp Petrol	90 000	44	Europe	15.0	92.80

(a) How many fields are there in **each** record?

.... [1]

(b) The following search condition was entered:

(**No of countries** < 30) AND (**Head office** = "Americas")

Using **Code** only, which records would be output?

....

.... [2]

(c) What search condition is needed to find out which oil companies have a share price less than $50 or whose profits were greater than 8 billion dollars?

....

....

.... [2]

13 A customer uses Internet banking. To gain access to their account they need:

- an 8-digit ID
- a 4-digit PIN
- a 10-character password

They will be asked to type in their ID, then 3 digits from their PIN and finally 3 characters from their password. Three attempts at the ID are allowed, but only one attempt at the PIN and at the password.

The flowchart on the next page shows the access process described above. However, most of the stages have been omitted.

Complete the flowchart, **using item number only**, from the list of items given.

Item number	Item description
1	access to account allowed
2	are any characters in the password incorrect?
3	are any digits in the ID incorrect?
4	are any digits in the PIN incorrect?
5	generate three random digits from the PIN
6	generate three random characters from the password
7	input the required three digits from the PIN
8	is number of digits < 8 or number of digits > 8?
9	is X > 2?
10	output "access to account denied"
11	X = X + 1

```
              ( START )
                  │
                  ▼
            ┌───────────┐
            │   X = 0   │
            └───────────┘
                  │
                  │◄──────────────────────────┐
                  ▼                            │
   ( END )   /  INPUT    /                     │
      ▲     / 8-digit ID /                     │
      │    /───────────/                       │
      │          │                             │
      │          ▼                   ┌──────────────┐
   /─────────/  Yes  ◇               │              │
  /         /◄───────◇               └──────────────┘
 /─────────/          ◇                   ▲
      ▲          │                        │
      │          No                       │
      │          ▼                        │
      │          ◇──────── Yes ───────────┤
      │          ◇                        │
      │          │                        │
      │          No                       │
      │          ▼                        │
      │          ◇──────── Yes ───────────┘
      │          ◇
      │          │
      │          No
      │          ▼
      │    ┌───────────┐
      │    │           │
      │    └───────────┘
      │          │
      │          ▼
      │    /───────────/
      │   /           /
      │  /───────────/
      │          │
      │          ▼
      │   Yes   ◇
      │◄────────◇
      │          ◇
      │          │
      │          No
      │          ▼
      │    ┌───────────┐
      │    │           │
      │    └───────────┘
      │          │
      │          ▼
      │    /  INPUT    /
      │   / 3 characters /
      │  / from password /
      │ /─────────────/
      │          │
      │  Yes     ▼    No    ┌──────────────┐
      └────────◇────────────│              │──────( END )
               ◇            └──────────────┘
```
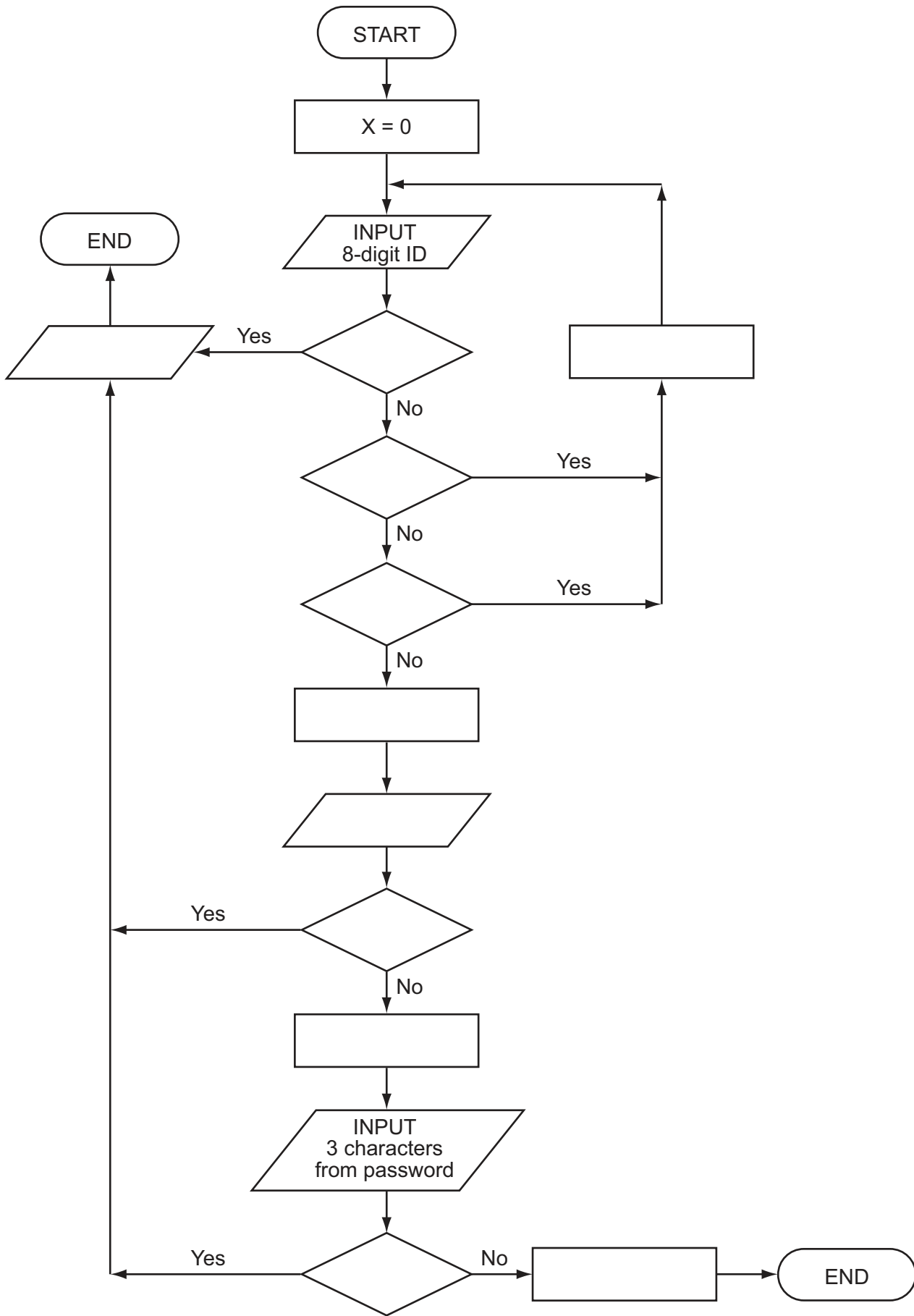
[6]

14 An aeroplane uses **three** separate computer systems to monitor and control the flight process while in *auto pilot mode*.

(a) Explain the advantages of using three computers rather than just one.

....

....

....

.... [2]

(b) Sensors are used to measure air speed. The readings are sent to the three computers.

Describe how the sensors and computers are used to control the aeroplane's speed in auto pilot mode.

....

....

....

....

....

....

....

.... [4]

(c) The aeroplane uses GPS (global positioning system) technology to navigate to its destination.

    (i) How does GPS link with the computers to ensure the correct flight path (for example, direction) is maintained?

       ....

       ....

       ....

       ....

       ....

       .... [3]

    (ii) Give **one** benefit and **one** drawback of using GPS.

       benefit ....

       ....

       drawback ....

       .... [2]

15 A spreadsheet was set up to allow customers to work out their monthly payments when borrowing money from a bank. The customer inputs data in column B.

The spreadsheet is as follows:

	A	B	C
1	**Interest Calculator**		
2	*INPUT PRICE OF GOODS*	20 000	
3	*INPUT YOUR DEPOSIT*	5 000	
4	AMOUNT OF MONEY TO BORROW		15 000
5	*INPUT % INTEREST RATE*	8.0	0.08
6	*INPUT NUMBER OF YEARS*	4	
7	INTEREST TO PAY		4800
8	YOUR MONTHLY REPAYMENTS		412.50

(a) Cell **C4** contains the amount of money to borrow.

What formula must be in cell **C4**?

= .... [1]

(b) Cell **C5** contains the % interest rate as a decimal (for example, 8% shows as 0.08).

What formula must be in cell **C5**?

= .... [1]

(c) Cell **C7** contains interest to pay which is found from

amount of money borrowed × interest rate as a decimal × number of years.

What formula must be in cell **C7**?

= .... [1]

(d) Cell **C8** contains the monthly repayment which is found from

sum of the amount borrowed and interest to pay
divided by total number of months.

What formula must be in cell **C8**?

= .... [2]

(e) Give **two different** validation checks you would use for inputs to cells:

B2 ....

....

....

B5 ....

....

.... [2]

(f) Describe how you would test the spreadsheet to ensure it works correctly.

....

....

....

....

.... [2]

16 A small shop uses barcodes which represent 5 digits. The last digit is used as a check digit.

For example:

a	b	c	d	e
0	1	2	3	4

The check digit (**e**) is found by:

- multiplying the first and third digits (i.e. **a** and **c**) by 3
- multiplying the second and fourth digits (i.e. **b** and **d**) by 2
- adding these four results together to give a total
- dividing this total by 10
- remainder is check digit (**e**)

Write an algorithm, using pseudocode or flowchart only, which

- inputs 100 five-digit barcodes in the form a, b, c, d, e
- re-calculates the check digit for each number and checks whether the input check digit (**e**) is correct
- outputs the number of barcodes which were entered correctly

[5]