UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

CENTRE
NUMBER

CANDIDATE
NUMBER

COMPUTER STUDIES **0420/13**

Paper 1 **October/November 2011**

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

For
iner's

1   (a) Give **two** benefits of networking a set of computers.

1   ....

....

....

2   ....

....

.... [2]

(b) A college decides to use network computers with wireless capability.

Give **one** advantage and **one** disadvantage of using wireless systems.

Advantage: ....

....

Disadvantage: ....

.... [2]

2 The following table shows **three** applications which require specialist **output** devices.

For **each** application, suggest **one** possible **output** device and give a reason for your choice.

Application	Output device	Reason for choice of device
A visually impaired person using a word processor		
Using CAD to design a new engine		
Monitoring a house for burglars		

[6]

3   A user wishes to use a word processing application. They can either use a *command line interface* (CLI) or a *graphical user interface* (GUI) to open this application.

(a) Describe how both methods could be used to select the application including any input hardware needed.

(i)   CLI

....

....

....

....

(ii) GUI

....

....

....

.... [4]

(b) (i)   What is meant by *automatic data capture*?

....

....

....

(ii) Name a device used in automatic data capture and describe an application that uses it.

Device: ....

Application: ....

....

.... [3]

4   **Five** definitions and descriptions are shown below on the left hand side.

Five computer terms are shown on the right.

Match the definitions/descriptions on the left to the correct term on the right by drawing connecting arrows.

check if students' ages are in the range 11 to 18	verification
computer generated operation of a chemical process	validation
software that looks for information based on certain key words	simulation
system where all the data are collected first before being processed in one go	search engine
typing in a password twice to ensure it is correct	batch processing

[5]

5 When new software is produced it is usually accompanied by *user documentation* and *technical documentation*.

(a) Explain these two terms:

user documentation: ....

....

....

technical documentation: ....

....

.... [2]

(b) The following list contains items that can be found in either or both types of documentation.

Tick (✓) the box which indicates where you would find each item.

Item	User documentation only	Technical documentation only	Both user and technical documentation
how to save a file			
program listing/coding			
hardware and software requirements			
file structures			
list of variables			
how to load the software			
meaning of errors/error messages			

[3]

6 **(a)** What is meant by the term *web browser*?

....

.... [1]

(b) Rock-ICT has set up a website as shown below:

ROCK - ICT				
Home	Sales	Basket	Checkout	**Payment**

(i) {

Choose your payment method:

◉ credit card   (ii)

○ debit card

click here to go to CD website

(iii)
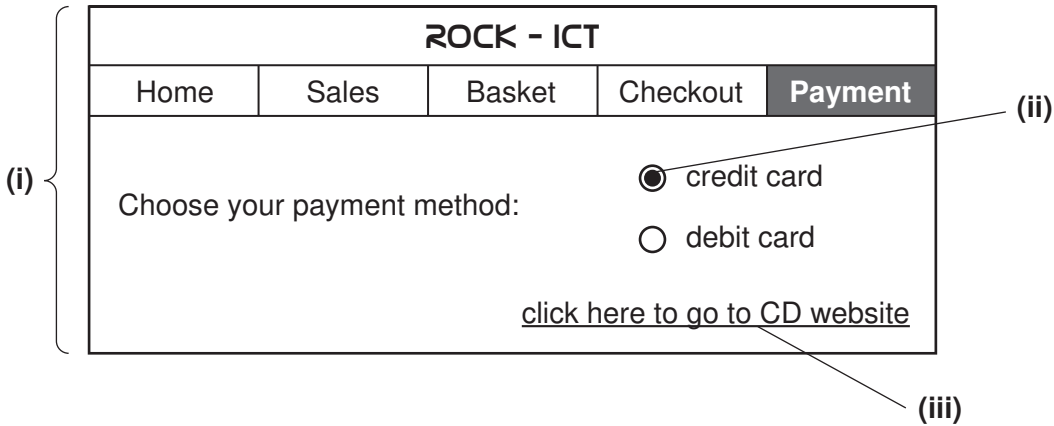
Give the names of the **three** parts that have been labelled:

(i) ....

(ii) ....

(iii) .... [3]

(c) How does the website recognise the user's buying preferences as soon as they visit the website?

....

.... [1]

(d) Hacking is one security issue associated with the Internet and emails.
State **two** other security issues.

1 ....

....

2 ....

.... [2]

7   The following flowchart inputs the size of a number of car engines; a value of -1 st___ ___
    input.

    The following information is output: *average engine size* and *number of engines with size*
    > 1.5.

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
                           ▼
        ┌──────────────────────────────────────┐
        │ engine = 0: count = 0: number = 0     │
        └──────────────────┬───────────────────┘
                           │
            ┌──────────────┤
            │              ▼
            │        ╱─────────────╲
            │       ╱    INPUT       ╲
            │       ╲    size        ╱
            │        ╲─────────────╱
            │              │
            │              ▼
            │         ◇─────────◇    Yes   ┌────────────────────────┐      ╱─────────────╲
            │        ◇  is size   ◇───────►│ average = engine/number│─────►╱   OUTPUT      ╲
            │        ◇  = −1 ?    ◇        └────────────────────────┘      ╲ average, count ╱
            │         ◇─────────◇                                           ╲─────────────╱
            │              │ No                                                  │
            │              ▼                                                     ▼
            │         ◇─────────◇    Yes   ┌────────────────────┐          ┌──────────┐
            │        ◇  is size   ◇───────►│ count = count + 1  │          │   STOP   │
            │        ◇  > 1.5 ?   ◇        └─────────┬──────────┘          └──────────┘
            │         ◇─────────◇                    │
            │              │ No ◄───────────────────┘
            │              ▼
            │   ┌────────────────────────┐
            │   │ number = number + 1    │
            │   └───────────┬────────────┘
            │               │
            │               ▼
            │   ┌────────────────────────┐
            └───│ engine = engine + size │
                └────────────────────────┘
```
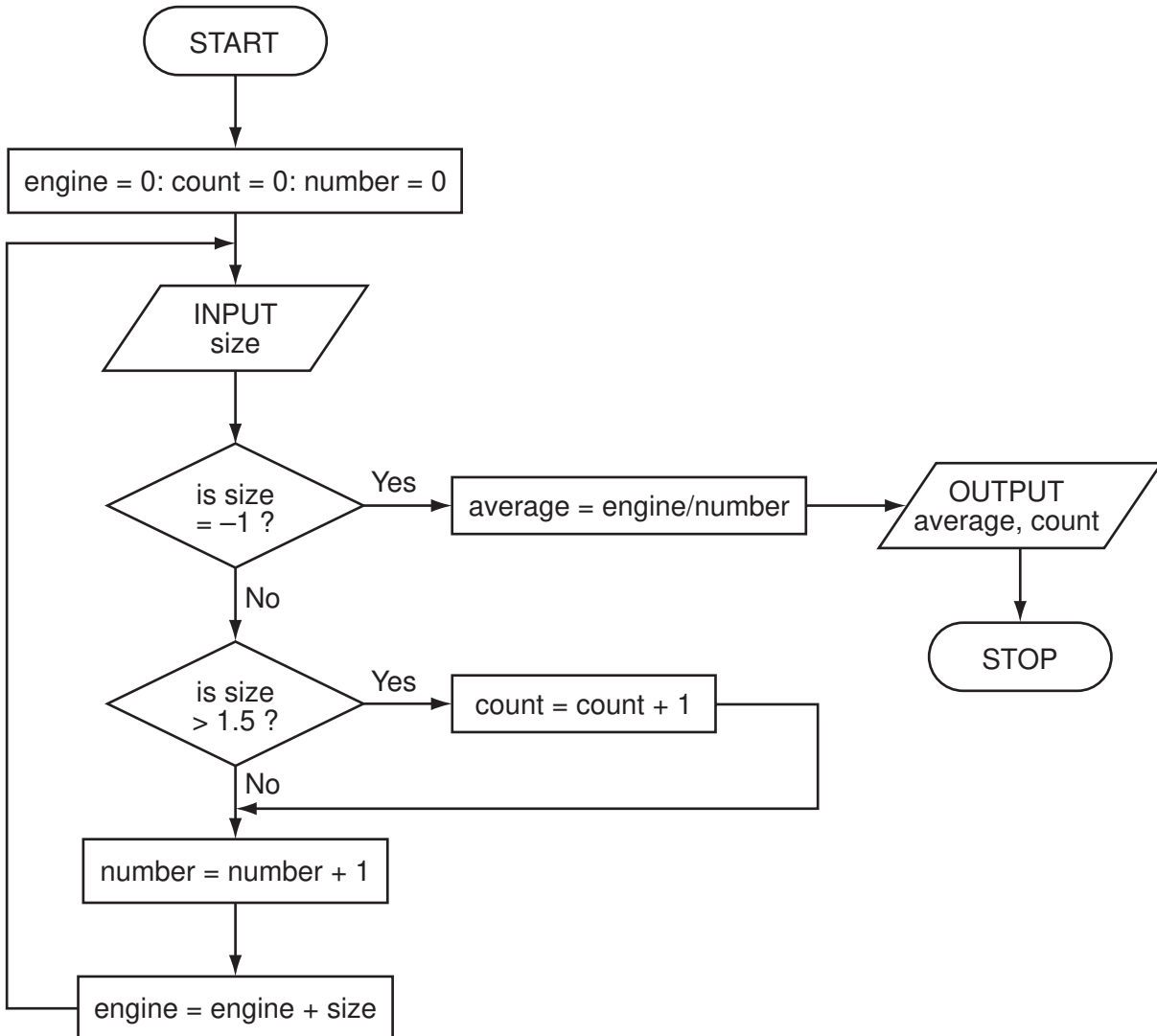
Complete the trace table for the following input data:

1.8, 2.0, 1.0, 1.3, 1.0, 2.5, 2.0, 1.3, 1.8, 1.3, -1

engine	count	number	size	average	OUTPUT

[6]

For
iner's

8 Robots are being introduced into a factory which makes engines.

(a) Describe **three** ways this could affect the workers.

1 ....

....

2 ....

....

3 ....

.... [3]

(b) One of the many advantages to management is the reduction in overall costs.

Give **two** reasons why using robots could reduce costs.

1 ....

....

2 ....

.... [2]

(c) Give **two** other advantages to the management of introducing robots.

1 ....

....

2 ....

.... [2]

9   A spreadsheet was set up to compare passenger costs for five airlines.

	A	B	C	D	E
1	Flight id	Distance (km)	Number of passengers	Total revenue ($)	Cost per passenger ($)
2	AA 151	3 000	240	60 000	250
3	AT 304	2 000	320	80 000	250
4	BR 106	1 500	150	45 000	300
5	CD 221	8 000	400	360 000	900
6	EX 115	6 000	280	140 000	500
7				Average cost:	

(a) What formula must be in E2 to calculate the cost per passenger.

.... [1]

(b) Cell E7 is to contain the average passenger cost.

What formula would need to be placed in this cell?

.... [1]

(c) It was decided to add two new columns (F and G) to find out if the airline made a profit
or loss on each flight. The costs per flight are calculated by multiplying **Distance (km)**
by 1/10th of the **Number of passengers**.

(i)   What formulas must be in column F?

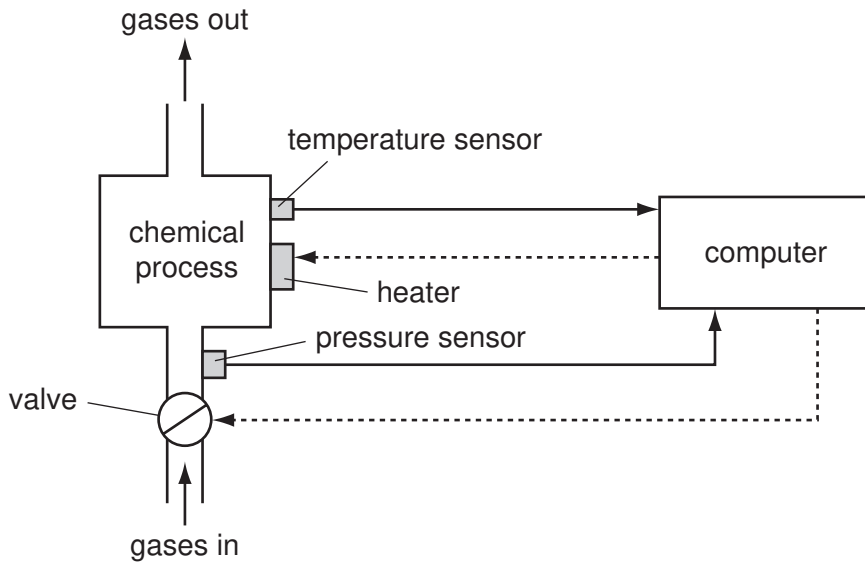|	F
1	Flight costs ($)
2	
3	
4	
5	
6	

[2]

(ii) The formula = **IF (F2 > D2, "Loss", "Profit")** was added to cell G2. What would
be output?

.... [1]

(iii) What formula would be in G5 after replication down from G2?

.... [1]

10 A computer system is being used to monitor and control a chemical process.

gases out
↑

temperature sensor

chemical
process

computer
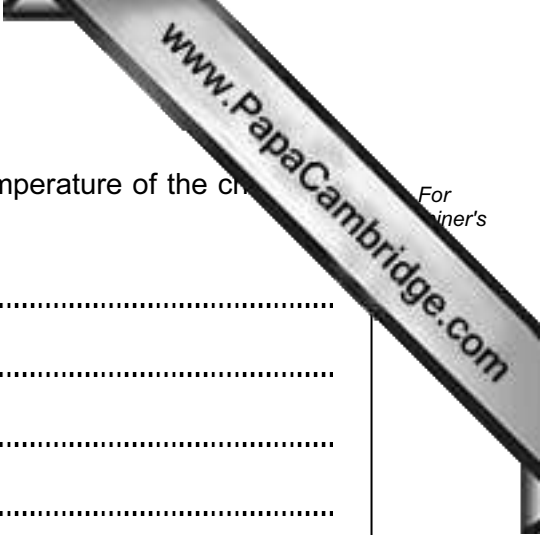
heater

pressure sensor

valve

gases in

(a) Data are collected from sensors at regular intervals and compared with stored values.

(i) Describe how the computer uses this data when **monitoring** the chemical process.

....

....

....

.... [1]

(ii) Describe how the computer uses this data when **controlling** the chemical process.

....

....

....

.... [1]

(b) What steps are necessary for the computer to control the temperature of the ch......
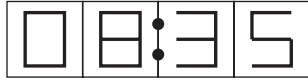
process?

....

....

....

....

....

....

....

.... [3]

(c) Name **two** other sensors and give a different application where they are used.

sensor 1: ....

application: ....

....

....

sensor 2: ....

application: ....

....

.... [4]

11 A digital alarm clock is controlled by a microprocessor. It uses the 24-hour clock (i.e. 6 pm is 18:00).

Each digit in a typical display is represented by a 4-digit binary code:

For example:

(clock display)

is represented by:

8	4	2	1	
0	0	0	0	1st digit (0)
1	0	0	0	2nd digit (8)
0	0	1	1	3rd digit (3)
0	1	0	1	4th digit (5)

(a) What time is shown on the clock display if the 4-digit binary codes are:

8	4	2	1
0	0	0	1
0	1	1	0
0	1	0	0
1	0	0	1

(clock display)

[2]

(b) What would be stored in the 4-digit binary codes if the clock display time was:

8	4	2	1	
				1st digit
				2nd digit
				3rd digit
				4th digit

[4]

(c) The clock alarm has been set at 08:00.

Describe the actions of the microprocessor which enable the alarm to sound at 08:00.

....

....

....

....

.... [2]

12 A database has been set up to show details about countries. Part of the database is
below.

Country code	Country	Continent	Area (millions sq km)	Population (millions)	Coastline	Currency
CH	China	Asia	9.6	1320	Yes	yuan
IN	India	Asia	3.8	1150	Yes	rupee
PO	Poland	Europe	0.3	39	Yes	zloty
BO	Bolivia	America	1.1	9	No	boliviano
TI	Tibet	Asia	1.2	2	No	yuan
BR	Brazil	America	8.5	192	Yes	real
RO	Romania	Europe	0.2	22	No	leu
SA	Saudi Arabia	Asia	2.2	28	Yes	riyal
ZA	Zambia	Africa	0.7	12	No	kwacha

(a) How many fields are in each record?

.... [1]

(b) Using **Country code** only, what would be output if the following search condition was
used?

(**Population (millions)** > 1000) **OR** (**Continent** = "Asia")

....

.... [2]

(c) Write down a search condition to find which countries have a land area less than 3
million square km and also have a coastline.

....

....

... [2]

(d) If the database was sorted in *descending order* of population size, using
Country code only, what would be the order of countries in the database?

....

....

.... [2]

13 The following flowchart shows how barcodes are used when a customer buys item[...] the supermarket. Barcodes are used to find the prices and to carry out stock co[...] Several stages are missing from the flowchart. These stages are shown in the item l[...] below.

Insert the correct statements, **using numbers only**, to complete the flowchart.
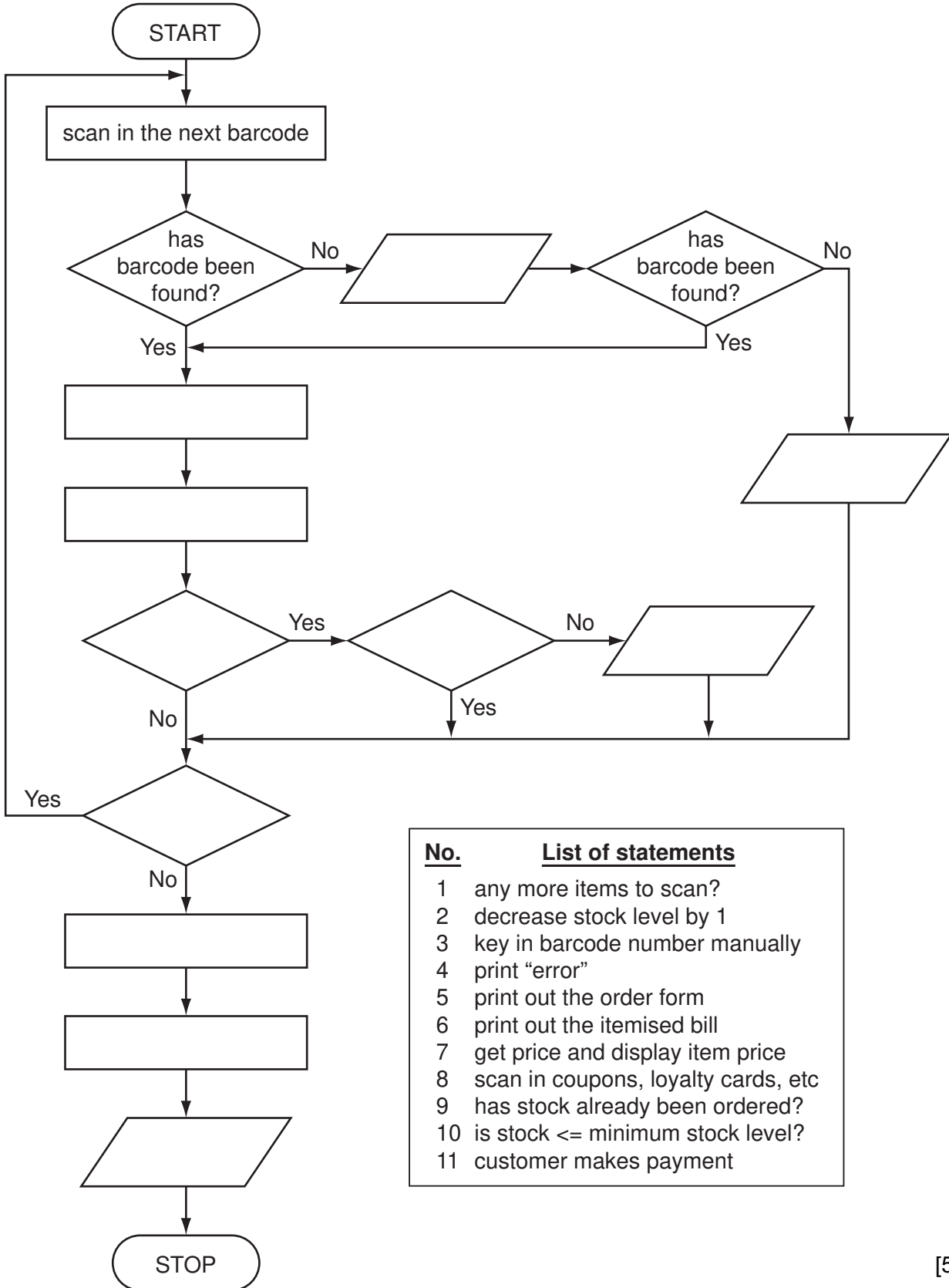
No.	List of statements
1	any more items to scan?
2	decrease stock level by 1
3	key in barcode number manually
4	print "error"
5	print out the order form
6	print out the itemised bill
7	get price and display item price
8	scan in coupons, loyalty cards, etc
9	has stock already been ordered?
10	is stock <= minimum stock level?
11	customer makes payment

[5]

14 An alarm, Y, sends a signal (Y = 1) when certain fault conditions in a chemical proce~~ss are~~ detected. The inputs are:

Input	Binary value	Condition
A	1	acidity > 5
	0	acidity <= 5
T	1	temperature >= 120°C
	0	temperature < 120°C
S	1	stirrer bar ON
	0	stirrer bar OFF

The alarm, Y, returns a value of 1 if:

either **(i)** temperature >= 120°C AND stirrer bar is OFF

or **(ii)** acidity > 5 AND temperature < 120°C

(a) Draw the logic circuit for the above system using these logic gates.
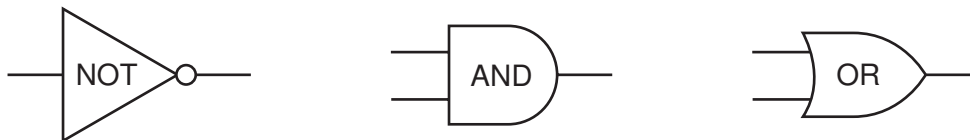
[5]

(b) Complete the truth table for this alarm system.

A	T	S	Y
0	0	0	
0	0	1	
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	
1	1	1	

[4]

15 A student gave the following **three** computer definitions.

Give the name of the term being described in **each** case.

(i) *"a signal from a device sent to a computer causing the CPU to stop its current operation temporarily"*

....

....

(ii) *"an exchange of signals between two devices when communicating to ensure synchronisation"*

....

....

(iii) *"a temporary memory to store data waiting to be sent to a device"*

....

.... [3]

16 The weather conditions in a town are being monitored over a year (365 days). The [...] recorded *per day* are weather type and temperature (e.g. CLOUDY, 25)

Write an algorithm, using pseudocode or flowchart only, which:

- inputs the weather type and temperature for **each** day
- outputs the number of days that were CLOUDY, RAINING, SUNNY or FOGGY
- outputs the highest recorded temperature for the year
- outputs the lowest recorded temperature for the year

....

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.... [6]