

CHINIOT ISLAMIA PUBLIC SCHOOL AND COLLEGE

1ST QUARTERLY TEST

testing - CS OI P2

Name: _____	Section: _____	Roll No: _____
-------------	----------------	----------------

Time: 2 Hours

Total Marks: 100

Name: _____ **Section:** _____

1.

Consider the logic statement:

$$X = (((A \text{ NAND } B) \text{ NOR } (B \text{ AND } C)) \text{ OR } C)$$

(a) Draw a logic circuit to match the given logic statement.

All logic gates must have a maximum of **two** inputs. Do **not** attempt to simplify the logic statement.



[4]

(b) Complete the truth table for the given logic statement.

A	B	C	Working space	X
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]

2.

A factory that manufactures cleaning products has a system that monitors conditions throughout the manufacturing process.

The inputs to the system are:

Input	Binary value	Condition
A	1	pH > 7
	0	pH <= 7
T	1	Temperature < 35 °C
	0	Temperature >= 35 °C
P	1	Pressure >= 80 %
	0	Pressure < 80 %

(a) The system will sound an alarm (**X**) when certain conditions are detected.

The alarm will sound when:

- The pressure >= 80 % and the temperature >= 35 °C

or

- The temperature < 35 °C and the pH > 7

Draw a logic circuit to represent the alarm system in the factory. Each logic gate must have a maximum of two inputs.



(b) Complete the truth table for the given logic problem.

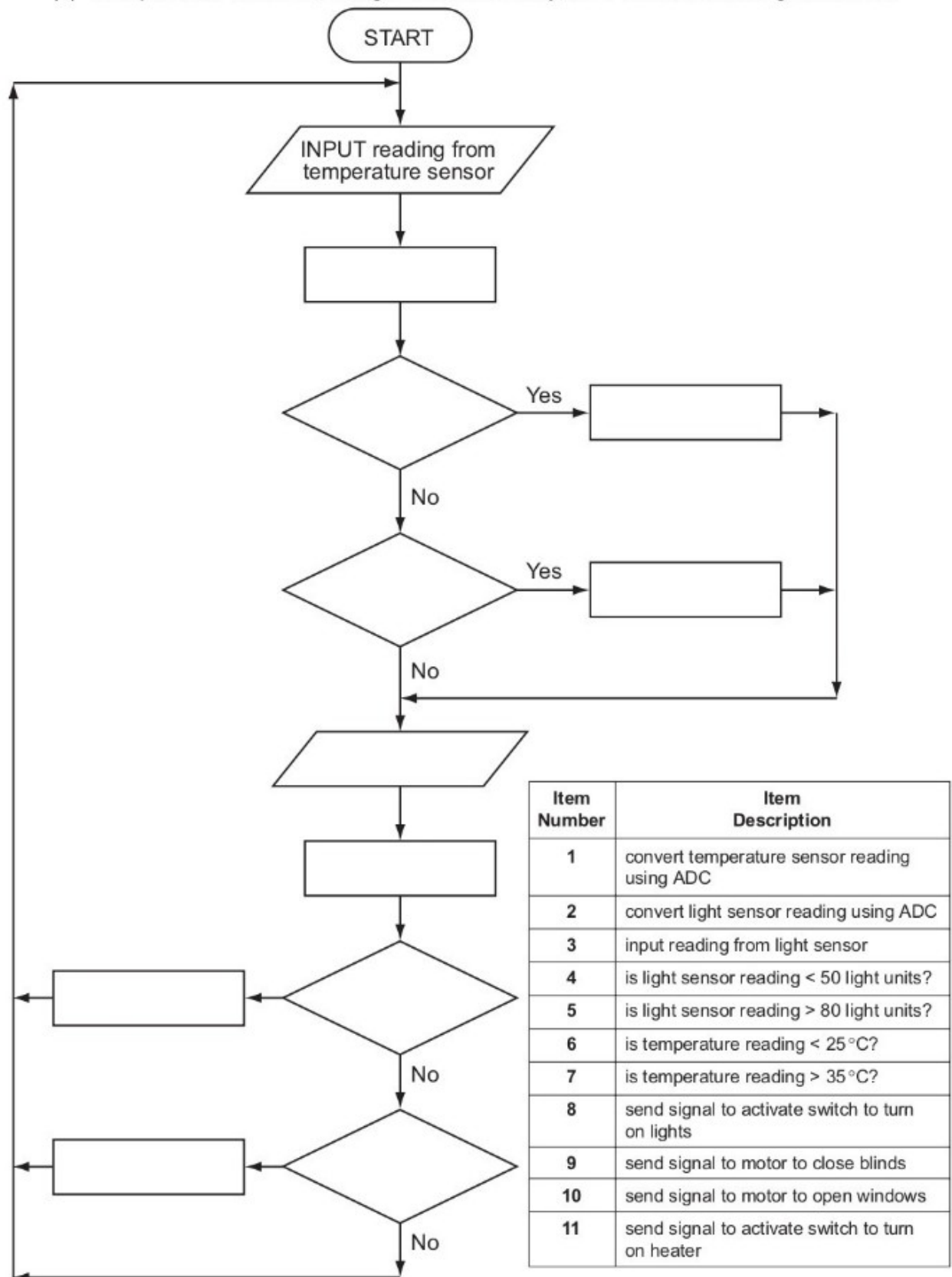
A	T	P	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

3.

The following flowchart shows how a computer and sensors are used to control the environment in a greenhouse. Temperatures must be between 25°C and 35°C. Light must be between 50 and 80 light units.

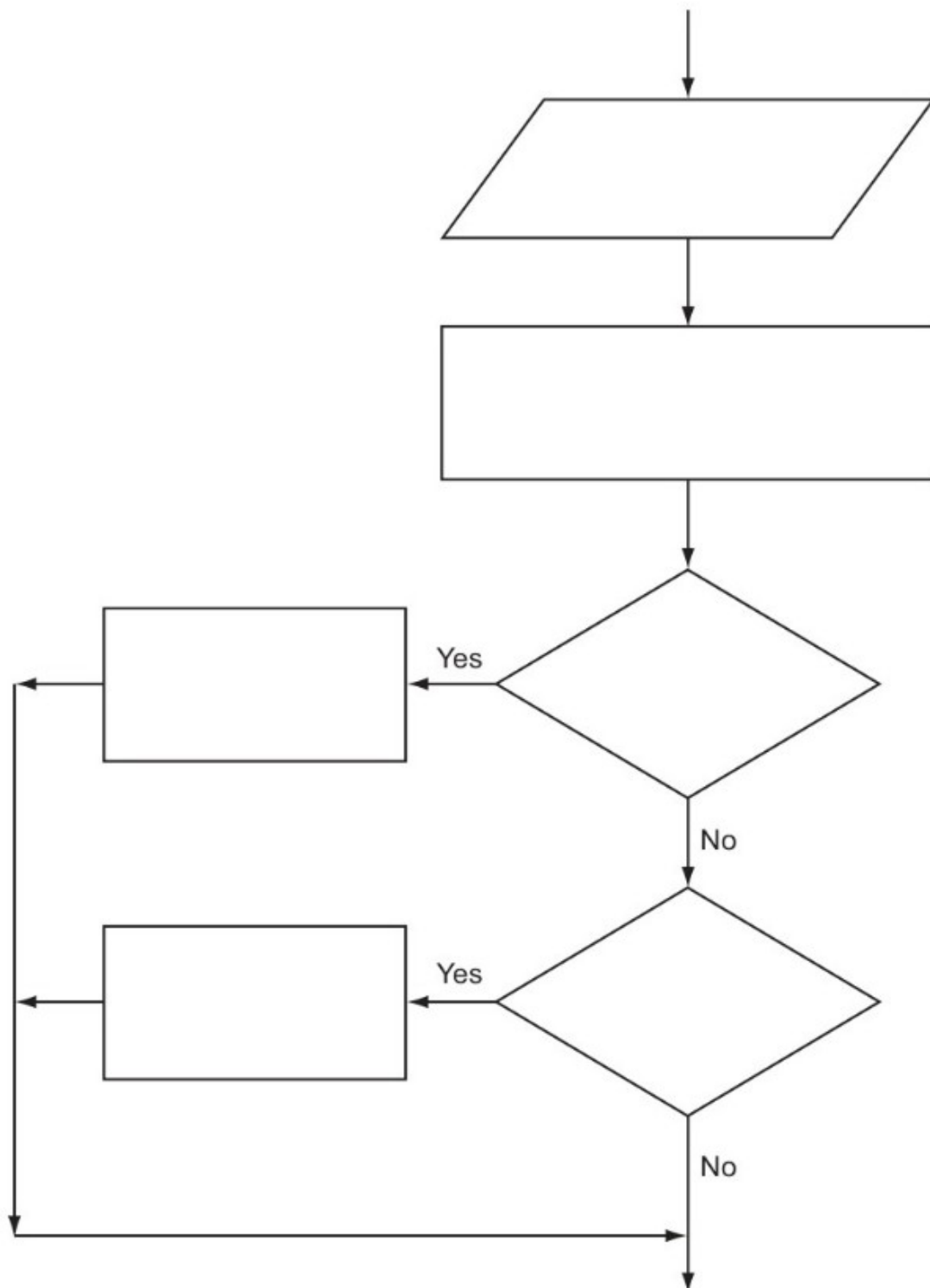
(a) Complete the flowchart, using item number only, from the list of items given below.



The computer also checks on humidity levels (using humidity sensors) which must be between the values of 40 and 90.

If humidity is too low, water is sprayed into the air.
If humidity is too high, fresh air is allowed to enter.

Write the necessary commands in the following flowchart section to show how the humidity levels are controlled:



4.

A DVD recorder is protected by three sensors (S, T and P). The output from these sensors forms the inputs to a logic circuit. A certain combination of input values produces an output of 1 from the logic circuit. When this occurs a warning message is shown on the DVD display. The following table shows which parameters are being monitored and form the three inputs to the logic circuit:

Parameter description	Parameter	Binary value	Description of condition
rotation speed	S	0	rotation speed ≥ 1000 rpm
		1	rotation speed < 1000 rpm
tilt angle	T	0	tilt angle $\geq 30^\circ$
		1	tilt angle $< 30^\circ$
laser power	P	0	laser power < 150 mW
		1	laser power ≥ 150 mW

The output X will have a value of 1 if any of the following combination of conditions occurs:

- » either rotation speed ≥ 1000 rpm and tilt angle $< 30^\circ$
 - » or rotation speed < 1000 rpm and laser power ≥ 150 mW
 - » or tilt angle $\geq 30^\circ$ and laser power < 150 mW
- a** Write down a logic or Boolean expression for the above system. [2]
b Draw a logic circuit to monitor the above system. [6]

5.

Consider the following logic statement:

$$X = ((B \text{ AND NOT } A) \text{ XOR } (A \text{ OR } C))$$

(a) Draw a logic circuit to match the given logic statement.

All logic gates must have a maximum of **two** inputs. Do **not** attempt to simplify the logic statement.



[4]

(b) Complete the truth table for the given logic statement.

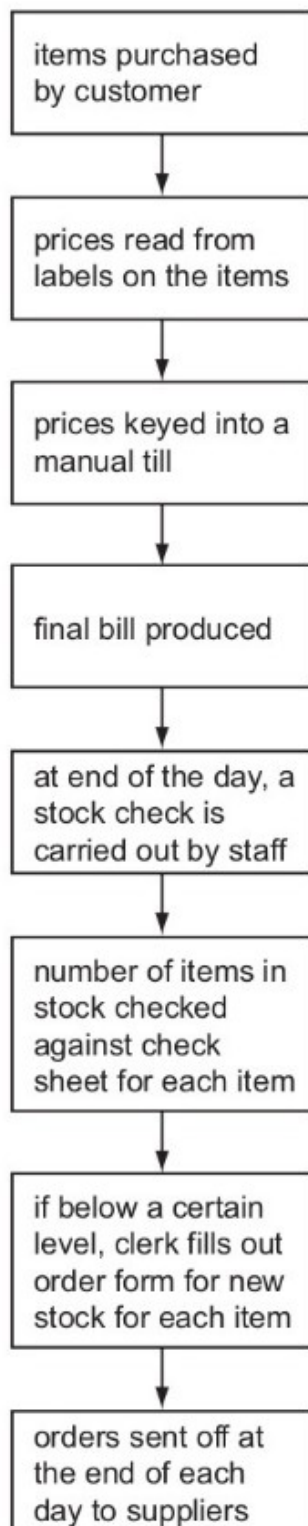
A	B	C	Working space	X
0	0	0		
0	0	1		
0	1	0		
0	1	1		
1	0	0		
1	0	1		
1	1	0		
1	1	1		

[4]

6.

Flowchart A

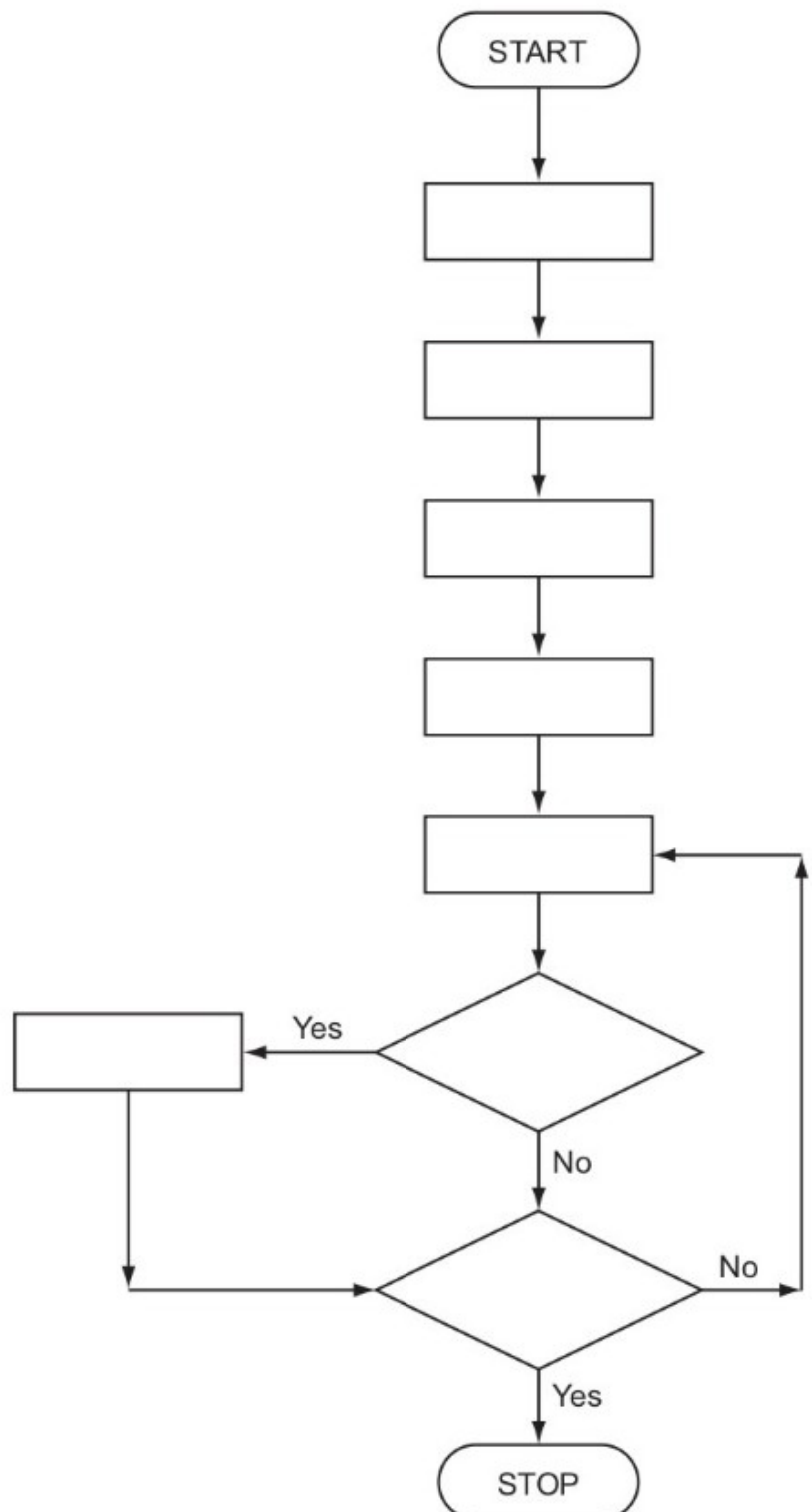
shows an existing manual system used by a shop to calculate a customer's bill and carry out stock control.



existing manual system

Flowchart B

shows the intended automatic computer-controlled system.



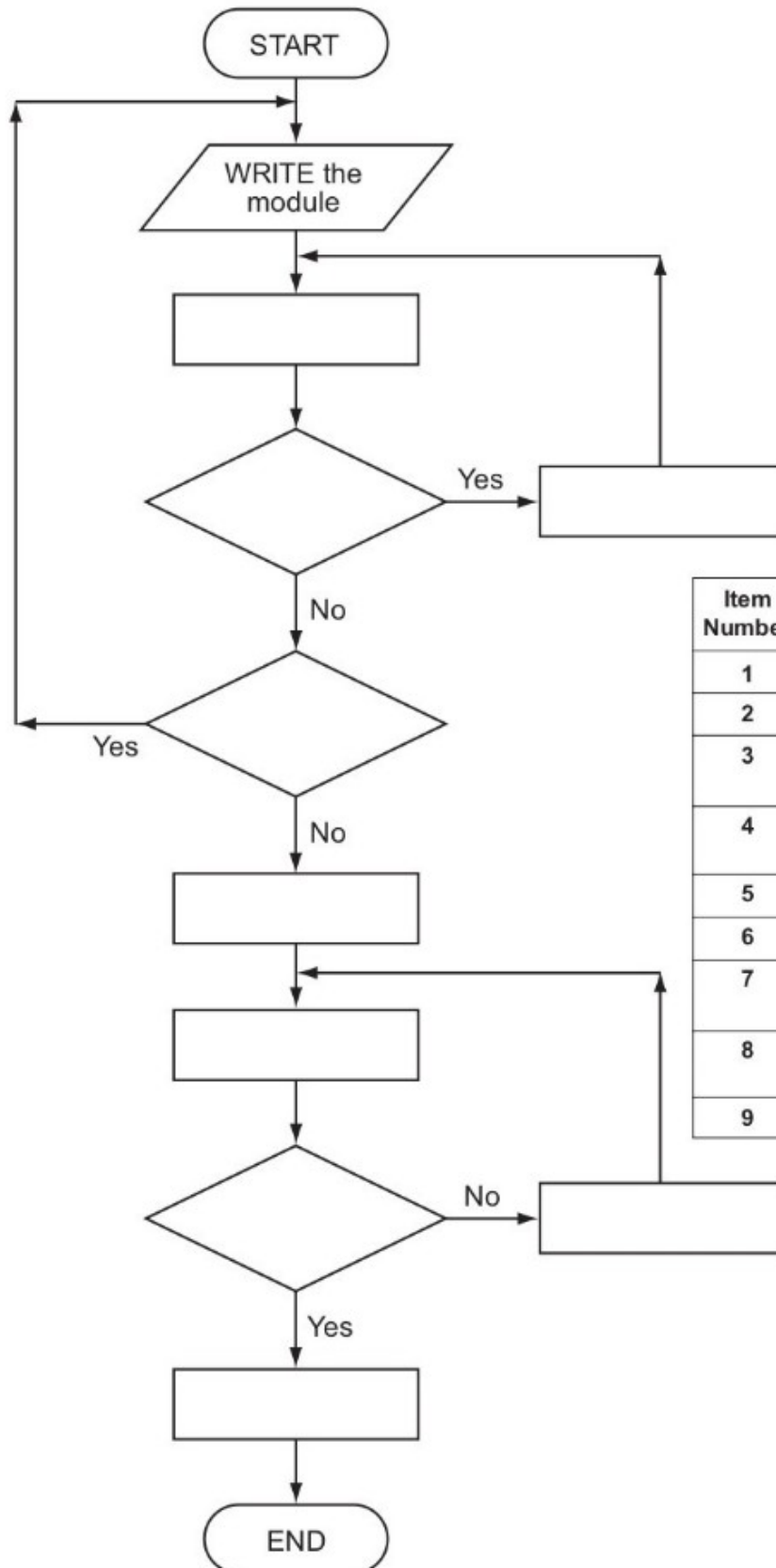
intended automatic computerised system

Using item numbers only from the following list, complete **Flowchart B**.

Item Number	Description
1	each item quantity reduced by 1 on the database
2	is stock level of item $\leq$ re-order level?
3	item price found on database
4	quantity of stock item checked against re-order level at end of the day
5	order for new stock of each item automatically sent out
6	barcode on each item scanned
7	have all items been checked?
8	an itemised bill is produced

A large word processor is being developed by first writing a series of modules. These are then put together to form the final word processor. Testing is done on each module and on the final word processor. The following flowchart shows how this word processor is developed. Several of the stages have been omitted.

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



ITEM LIST

Item Number	Item Description
1	any errors in the module?
2	any more modules to write and test?
3	combine all modules to form final word processor
4	does final word processor give expected results?
5	modify final word processor
6	modify the module
7	test module using data with known outcomes
8	test final word processor using data with known outcomes
9	write user documentation

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

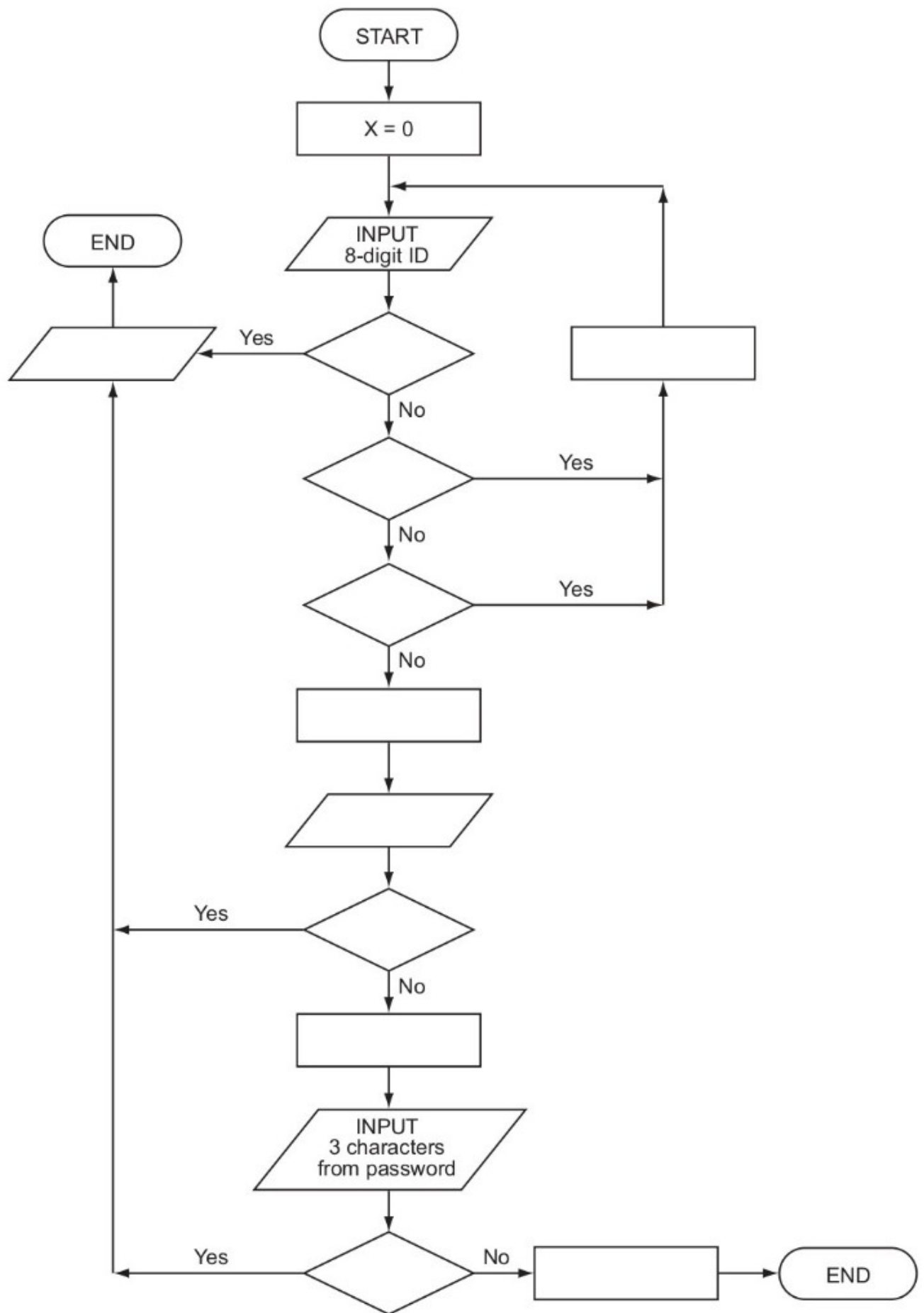
- an 8-digit ID
- a 4-digit PIN
- a 10-character password

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	$X = X + 1$

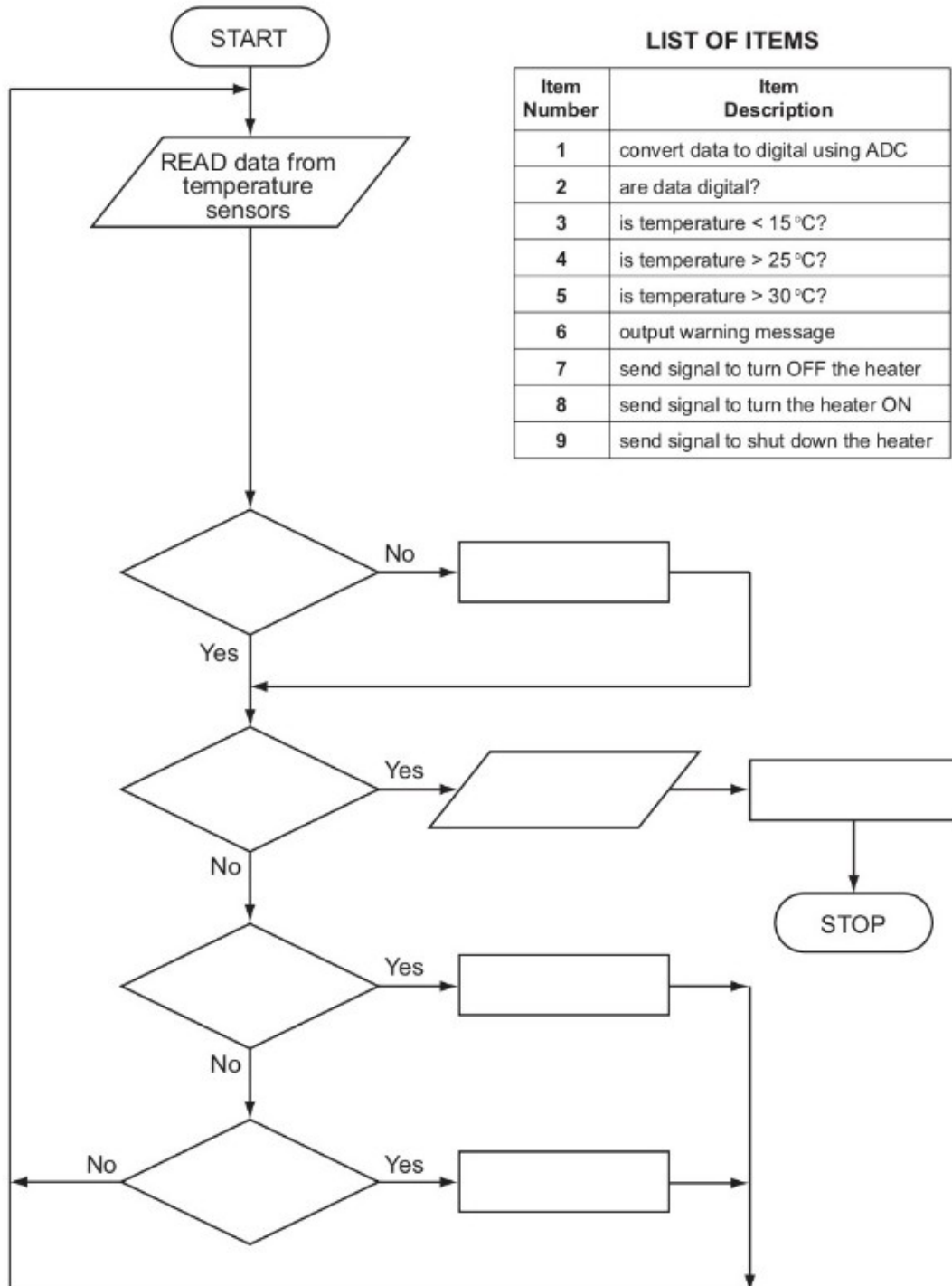


9.

- A heating system is being controlled by sensors and a computer. The temperature must be kept between 15°C and 25°C. If 30°C is exceeded a warning message is generated and the system shuts down.

A flowchart of the process is shown below. Some of the items are missing.

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



[4]

10.

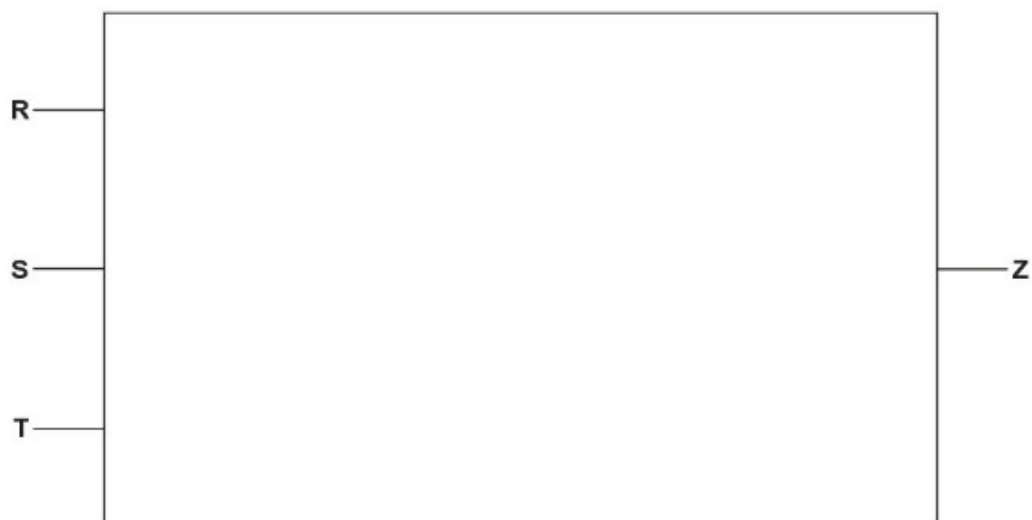
Consider the logic expression:

$$Z = (R \text{ OR NOT } T) \text{ XOR } (\text{NOT } S \text{ AND } T)$$

(a) Draw a logic circuit for this logic expression.

Each logic gate must have a maximum of **two** inputs.

Do **not** simplify this logic expression.



[5]

(b) Complete the truth table from the given logic expression.

R	S	T	Working space	Z
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]