Engineering Science

PBasic & Systems

Class Test

Name:- .....

Class Teacher:- .....

Date:- .....

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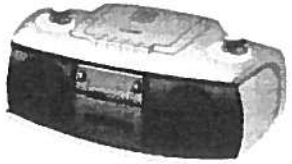
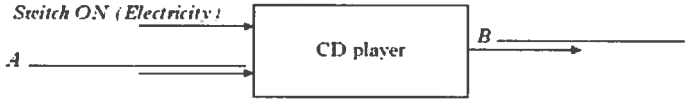
KU	RNA
	2
	1
	0
3	
2	
1	
0	

1 A CD player is shown below.



(*a*) Complete the diagram below for the CD player by adding one **main** input and one **main** output. One input has been provided for you.



(*b*) Draw the Universal System Diagram.

8 **(*b*) (continued)**

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(iii) Describe, with the aid of a sketch, how this technique is used to control the speed of a motor.

_____

_____

_____

_____

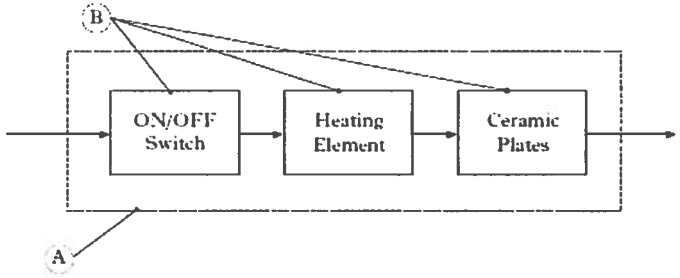
3
2
1
0

2 Hair straighteners are shown below.

(*a*) Complete the system diagram below for the hair straighteners by adding one main input energy and one main output energy.

2
1
0

(*b*) The main parts of the hair straighteners are shown below.



(i) A separates the system from the outside world.

State the name of this part of the diagram.

_____

1
0

(ii) The whole system can be broken down into several parts labelled above as B.

State the name given to these parts.

_____

1
0

[Turn over

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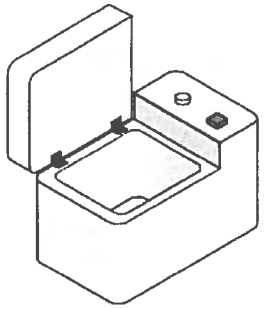
3 A model of a bread making machine is operated by a microcontroller.



The sequence of operations for the breadmaker is shown below:

- the sequence begins when the start switch is pressed and the lid closed;
- the mixer motor runs for 10 seconds then stops;
- the heater switches on for 20 seconds then switches off;
- the sequence is reset.

Input Connection	Pin	Output Connection
	7	
	6	Heater
	5	Mixer motor
	4	
	3	
Lid sensor	2	
Start switch	1	
	0	

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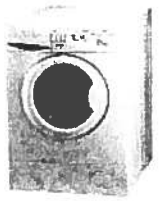
1 0	

8 A washing machine is operated by a microcontroller.



The drum motor is connected in Pin 7 and a common programming technique is used to control the drum motor's speed.

(a) (i) Complete the PBASIC sequence to control the drum motor's speed with reference to the comments and the Data Booklet.

```
speed: _____________________   'set for . . . next loop to 200
       _____________________   'switch on drum motor (pin 7)
       _____________________   '5 ms delay
       _____________________   'switch off drum motor (pin 7)
pause 10                       '10 ms delay
       _____________________   'loop until completed
return                         'return to main program
```

5 4 3 2 1 0

(ii) State the **full name** of the technique used to control the motor speed in the program above.

_____

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	8 7 6 5 4 3 2 1 0

7 (continued)

Input and output connections to the microcontroller are shown in the table below.

Input Connection	Pin	Output Connection
	7	Power supply shut off (1 = shut off, 0 = power on)
	6	Warning light
	5	
	4	
	3	
	2	
	1	
Sound sensor (1 = loud, 0 = quiet)	0	

Complete, with reference to the flowchart, Data Booklet, and the input/output connections, the PBASIC control program.

```
        symbol counter = b0     'define counter address b0

main:   if pin0 = 0 then main   'if sound level is quiet then jump to main
                                'set for . . . next loop to 10
```


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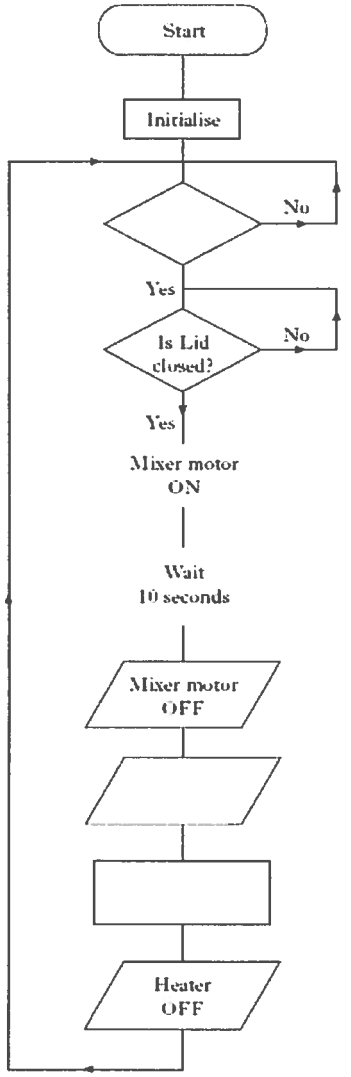
	5 4 3 2 1 0

3 (continued)

(a) Complete the flowchart by adding the correct symbols and instructions. You should refer to the sequence and Data Booklet when answering this question.



3 **(continued)**

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(*b*) With reference to the microcontroller connections and flowchart, complete the PBASIC program.

```
main:   if pin 1 = 0 then main        'test pin 1
label:  _____                         'test pin 2
        high 5                        'switch on mixer motor
        pause 10000                   '10 second delay
        _____                         'switch off mixer motor, switch on heater
        _____                         '20 second delay
        low 6                         'switch off heater
        _____                         'reset program
```

RNA: 4 3 2 1 0

(*c*) State the name of the microcontroller parts for each of the following functions.

(i) Function *Permanent memory where a program or data is stored*

Full name _____

(ii) Function *Temporary working memory of the micocontroller*

Full name _____

KU: 2 1 0

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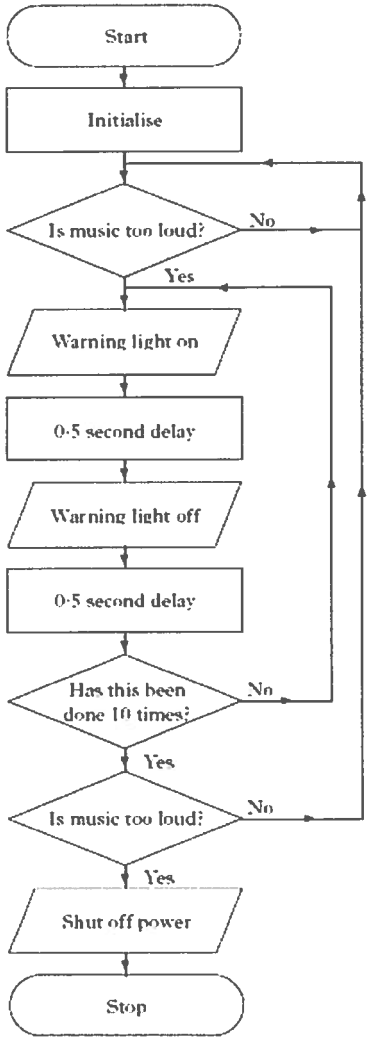
7 A music venue has a system to cut off the power supply if a band plays too loudly. The system is operated by a microcontroller.

A flowchart for the control system is shown below.



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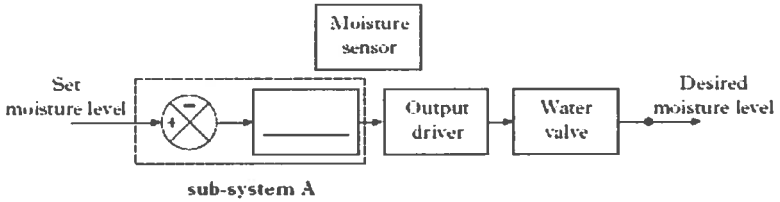
6 The moisture level in a greenhouse is controlled automatically.

(a) Complete the **control** diagram below.



sub-system A

2
1
0

(b) State the type of control produced by this automatic system.

1
0

(c) State a suitable electronic device which could be used for the output driver sub-system.

1
0

(d) Describe the operation of **sub-system A**.

2
1
0

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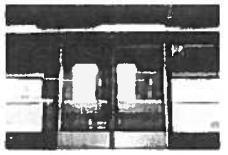
4 A microcontroller program is used to operate the door on a train.



The control program for the 'door' sub-procedure is part of a larger program.

The steps in the 'door' sub-procedure are listed below.

- The sequence begins with the door opening.
- The door stays open for 10 seconds.
- The door closes.
- For safety reasons, should a passenger be sensed, the sub-procedure will repeat.

(a) Complete, with reference to the Data Booklet, the flowchart below for the 'door' sub-procedure.

7
6
5
4
3
2
1
0

4 **(continued)**

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(*b*) The program requires pins 4, 6 and 7 to be set as outputs and the rest as inputs. With reference to the Data Booklet:

(i) state the PBASIC command for this setup;

_____ 2 1 0

(ii) state the PBASIC command used to produce a 10 second delay.

_____ 1 0

(*c*) State the **full name** and **function** of the following microcontroller terms.

(i) **ROM**

Full name _____ 2 1 0

Function _____

(ii) **RAM**

Full name _____ 2 1 0

Function _____

(iii) **ALU**

Full name _____ 2 1 0

Function _____

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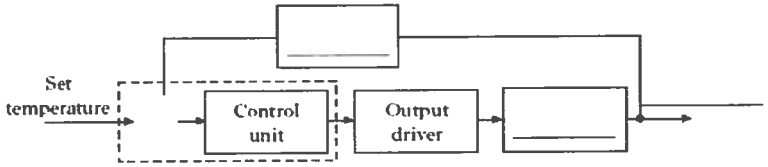
5 An air conditioning system is operated by closed loop control.

(*a*) Complete the **control** diagram below.



2 1 0

(*b*) State a suitable electronic component which could be used for the output driver sub-system.

_____ 1 0

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