

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Secondary Education



CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Gyffredinol Addysg Uwchradd

294/01

ELECTRONICS

MODULE TEST E2

FOUNDATION TIER

A.M. THURSDAY, 8 June 2006

(45 minutes)

For Examiner's use only

Total Mark	
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ADDITIONAL MATERIALS

In addition to this examination paper you may need a calculator.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

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

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

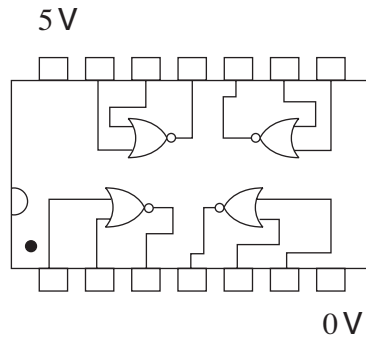
1. Here is a list of electronic sub-systems:

transducer driver micro-switch time delay solenoid

- (a) Which **one** of these is an input sub-system?
- (b) Which **one** of these is an output sub-system?
- (c) Which **one** of these keeps the output switched on for a fixed length of time?
.....

[3]

2. The following pin-out diagram shows a logic IC.



- (a) Label pin 1 of the IC with the number 1.
- (b) How many logic gates are contained in this IC?
- (c) How many inputs does each gate have?
- (d) What is the name given to the type of logic gate contained in this IC?

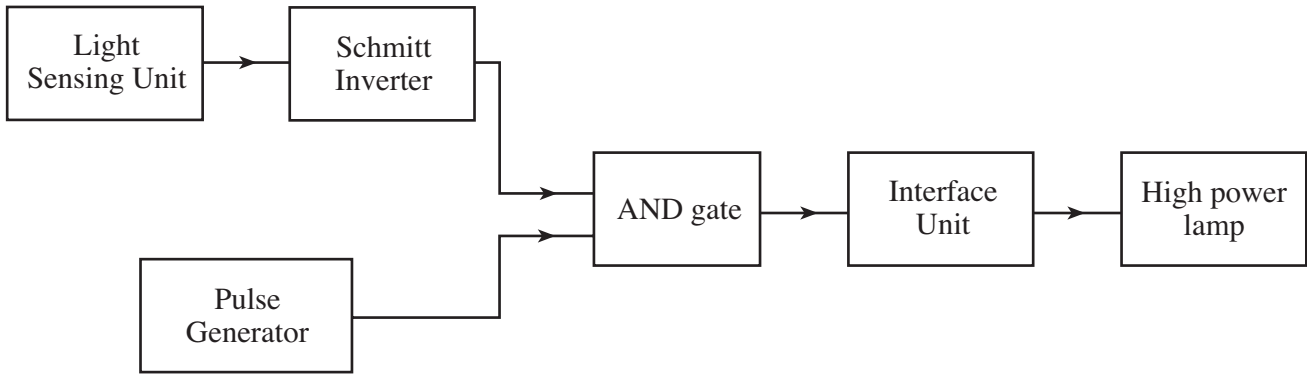
Choose from the following list:

AND OR NOT NAND NOR

.....

[4]

3. The block diagram below shows a design for a road works warning system that lights a flashing warning lamp when it gets dark.



(a) Which block contains

(i) a control to adjust the light level at which the lamp comes on?

.....

(ii) a control to adjust the rate at which the lamp flashes on and off?

.....

(iii) a 555 timer?

[3]

(b) Choose the most suitable component for the interface unit from the following list:

thyristor transistor comparator

.....

[1]

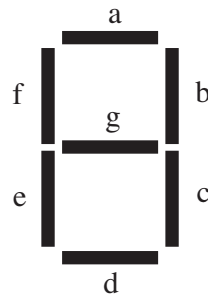
(c) One use for the Schmitt Inverter is to invert the signal from the light sensing unit. What is the other purpose of the Schmitt Inverter in **this** system?

.....

.....

[1]

4. The diagram shows the arrangement of the LEDs in a seven-segment display.

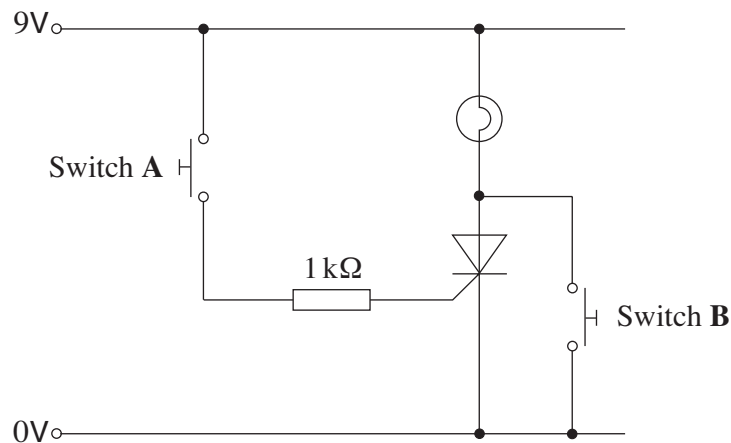


Complete the following table, which shows the number/letter displayed when different segments are lit.

SEGMENT							NUMBER/LETTER
a	b	c	d	e	f	g	DISPLAYED
1	0						6
							C
1	1	0	1	1	0	1	

[3]

5. The following diagram shows a thyristor circuit. Both switches are open.

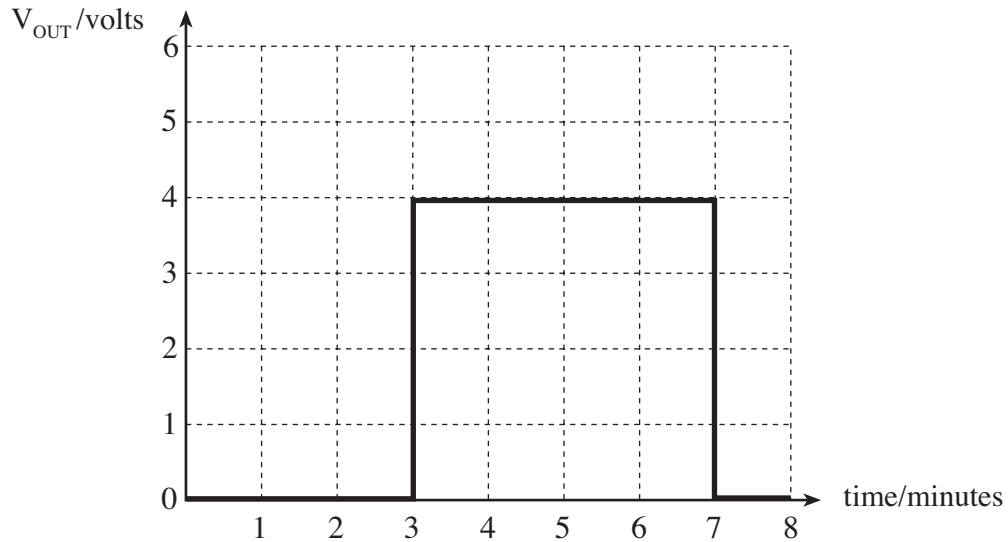


The switches are operated in the sequence shown below.
State whether the bulb is *on* or *off* for each step.

- Switch **A** is closed. The bulb is
- Switch **A** is opened. The bulb is
- Switch **B** is momentarily closed and then released. The bulb is now

[3]

6. The graph shows the output from a timer circuit. When its input is triggered, the output goes high for a fixed length of time, to produce this single pulse.



- (a) What is the name of the timer circuit that gives the output shown?

Choose your answer from the following list:

astable counter monostable

.....

[1]

- (b) For how long is the output of the timer circuit high?

[1]

- (c) What is the amplitude of the waveform shown in the graph?

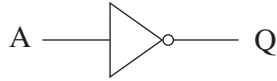
[1]

- (d) Give a practical application for this timer circuit.

..... [1]

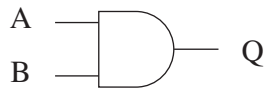
7. (a) Complete the truth table for the following logic gate.

(i) NOT



A	Q
0	
1	

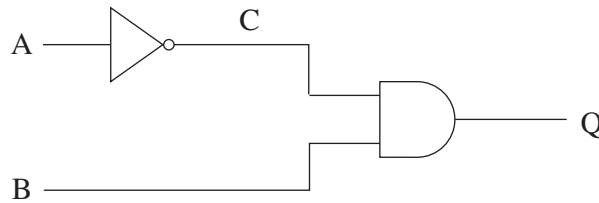
(ii) AND



A	B	Q
0	0	
0	1	
1	0	
1	1	

[2]

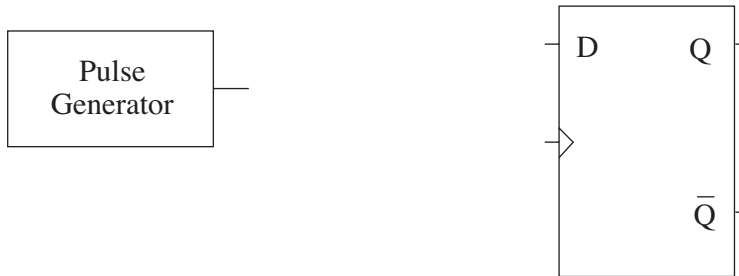
(b) Complete the truth table for the following logic system.



A	B	C	Q
0	0		
0	1		
1	0		
1	1		

[2]

8. (a) The diagram shows a pulse generator and a D-type flip-flop.



(i) The D-type performs a *divide-by-two* action on pulses from the pulse generator.

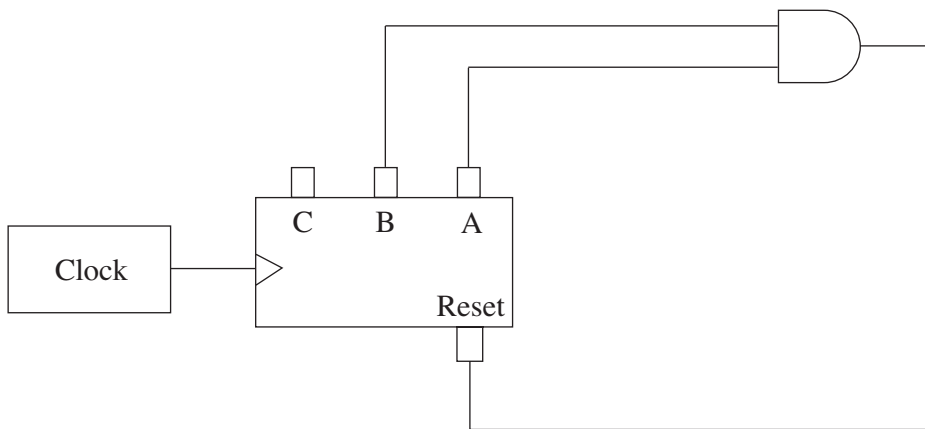
Draw the two connections needed to do this.

(ii) The frequency of the signal at the Q output is 100 Hz.

What is the frequency of the pulse generator?

[3]

(b) In the circuits below, bit A of the 3-bit counter is the least significant bit.



To begin with the counter is reset.

(i) Complete the following sentence by choosing your answer from the following list:

second third fourth fifth sixth seventh

The counter will reset on the clock pulse.

(ii) The output of **this** counter is decoded and shown on a seven-segment display.

What is the highest number shown?

[2]

9. (a) An electronic system has two input sensors **A** and **B**, and three outputs **Q**, **R** and **S**. The truth table showing how the input sensors control the outputs is shown below.

B	A	Q	R	S
0	0	1	1	1
0	1	0	1	0
1	0	0	1	1
1	1	0	0	0

- (i) Study the **Q** output. Which type of logic gate will provide this?
Logic gate is
- (ii) Study the **R** output. Which type of logic gate will provide this?
Logic gate is
- (iii) Study the **S** output. Write down an expression to describe this output.
S =

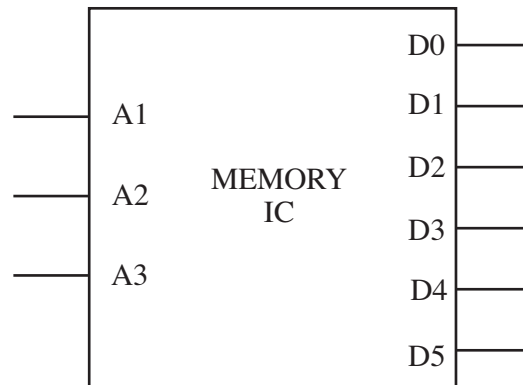
[3]

- (b) You have a selection of AND, OR, NOT, NAND and NOR gates available. Complete the diagram to show how the logic system can be made.



[3]

- (c) Another electronic system uses the following memory IC rather than logic gates. The system controls the lamps in a disco lighting sequence.



The IC has three address lines and six data lines.

- (i) Other than cost, give **one** advantage of using a memory IC instead of logic gates.

.....

- (ii) How many lamps can be controlled separately by this memory IC?

- (iii) What is the maximum number of sequence steps that can be stored in the IC?

Choose your answer from the following:

3 6 8 9 16

.....

[3]