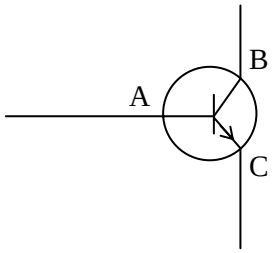
High Demand Questions QUESTIONSHEET 1

The diagram shows a type of transistor.




(a) Identify the legs labelled A, B, C

A: ..... [1]

B: ..... [1]

C: ..... [1]

(b) The current through leg a is 0.12mA and the current through leg B is 2.7mA.
What is the size of the current through leg C?

.....

..... [2]

(c) The transistor switches off if the current through leg A is low enough.
What effect does this have on the current through leg B?

.....

..... [1]



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High Demand Questions QUESTIONSHEET 2

(a) Draw a circuit in which a lamp comes on if the temperature in the room rises.

[3]

(b) How would you modify your circuit so that the temperature at which the lamp comes on is adjusted?

.....

.....

..... [2]



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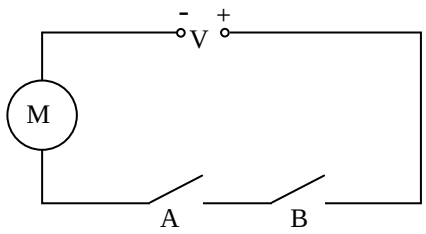
***GCSE PHYSICS*** **ELECTRONIC CONTROL**

High Demand Questions QUESTIONSHEET 3

A pillar drill in a factory cannot be operated unless a safety screen is down. A circuit diagram for this is shown:




A is the on/off switch for the drill
B is the switch for the safety screen

(a) Complete the table below to show when the drill moter is on or off.

| A *on/off* | B *safety screen* | *Drill on/off* |
|---|---|---|
| **on** | **on** | |
| **on** | **off** | |
| **off** | **on** | |
| **off** | **off** | |

[4]

(b)(i) You can represent "on" as logic level 1
and "off" as logic level 0

Draw up a table to show the above information in terms of logic levels

*A* *B* *Drill*

[4]

(ii) What is the name of the logic gate that could be used instead of switches?

..... [1]



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High Demand Questions QUESTIONSHEET 4

(a) Draw the symbol for an OR gate

[1]

(b) Complete the truth table for the OR gate.

| *A* | *B* | *Output* |
|---|---|---|
| | 0 | 0 |
| 0 | | |
| | | |
| | | 1 |

[4]



TOTAL / 5

High Demand Questions QUESTIONSHEET 5

(a) (i) How many inputs does a NOT gate have?

.....[1]

(ii) Draw up a truth table for a NOT gate.

[2]

(iii) What is the purpose of such a gate?

.....

.....[2]

(b) A NAND gate can be made from two other logic gates.

(i) Name the two gates

.....

.....[2]

(ii) Draw the logic circuit

[2]



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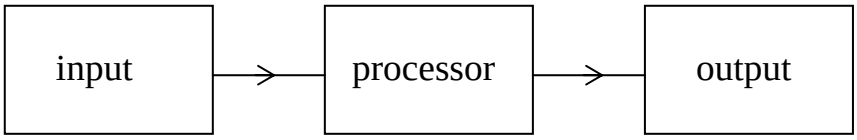
High Demand Questions QUESTIONSHEET 6

An open loop electronic control system is made up of




(a) What is meant by *feedback*?

.....

.....

..... [3]

(b) Add to the flow diagram to show feedback. [1]

(c) What is the advantage of feedback?

.....

.....

..... [3]



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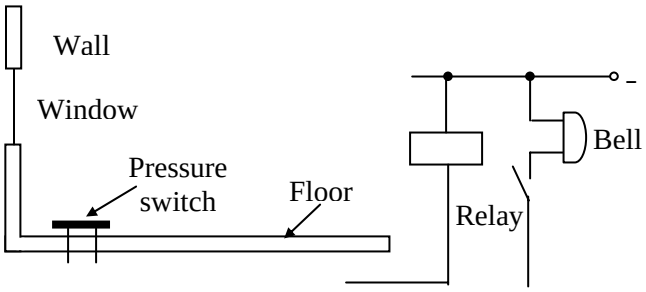
High Demand Questions QUESTIONSHEET 7

The diagram shows a circuit for a burglar alarn. The bell rings when someone stands on the pressure switch.




(a)What happens when the person moves elsewhere in the room?

.....

..... [1]

(b) (i) Add a wire to the circuit to enable the bell to continue to ring even through the pressure switch opens. [1]

(ii) What is needed to reset the circuit?

.....

..... [2]

(c) Why is this known as a bistable circuit?

.....

..... [2]



TOTAL / 6

It is compulsory to wear seat belts when a car is moving.
Some manufacturers put an alarm into the car to remind people to fasten their seat belts.

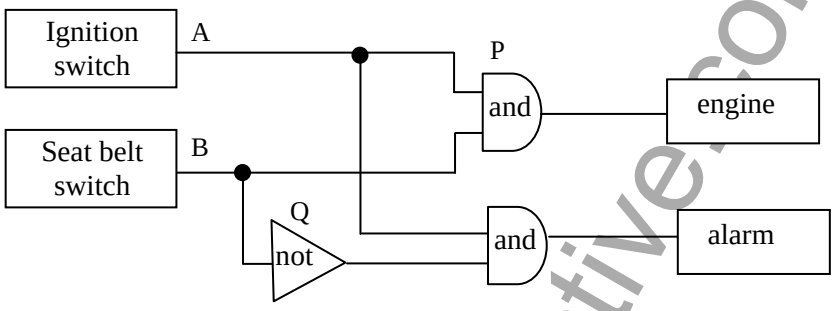
(a)Under what circumstances would you **not** want the alarm to sound?

.....

.....

..... [2]

(b)A circuit to achieve this is shown below.



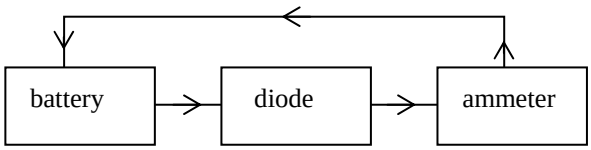

Complete the truth table below to show when the alarm should ring.

| **Input A** | **Input B** | **P (A and B)** | **Q (Not B)** | **alarm** |
|---|---|---|---|---|
| 0 | 0 | 0 | 1 | 0 |
| | | | | |
| | | | | |
| | | | | |

[5]

Medium Demand Questions QUESTIONSHEET 9

A diode is connected in series with a battery and an ammeter. The ammeter registers a current.




The diode is then taken out and replaced in the *reverse* direction.

(a) (i) What, if anything, is observed on the ammeter?

..... [1]

(ii) Explain your answer.

.....

.....

..... [2]

(b) The battery is now replaced by a source of alternating current.
Explain the effect of the diode in this new circuit. [3]
Include a sketch graph of the variation of current with time. [1]

.....

.....

.....

.....

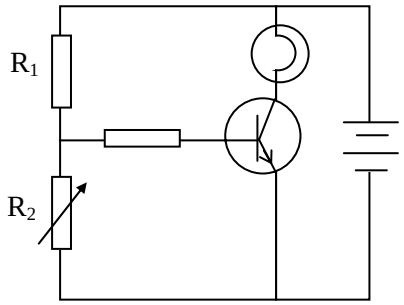
.....



TOTAL / 7

Medium Demand Questions QUESTIONSHEET 10

In the circuit below resistors $R_1$ and $R_2$ form a *potential divider*.




(a) Explain the words in italics.

.....

..... [2]

(b) When the voltage across the base and emitter of the transistor in the circuit is more than 0.6V, it switches on.

(i) Which component must be adjusted to switch the transistor on?

..... [1]

(ii) What effect does this have on the collector current?

.....

..... [1]

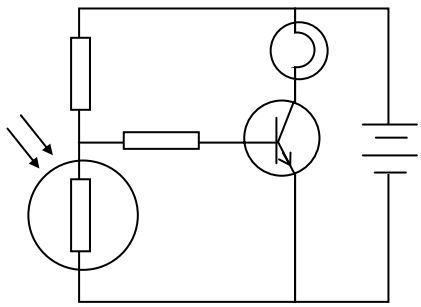
(iii) What would happen to the indicator lamp?

..... [1]



TOTAL / 5

The transistor circuit below uses a resistor and an LDR to form a potential divider.



(a) Describe what happens in this circuit if the LDR is covered up.

.....

.....

.....

..... [4]

(b) What component would you need in a heat-sensitive circuit?

..... [1]

Medium Demand Questions QUESTIONSHEET 12

An electrician wants to design a circuit for the porch light of a home so that it only comes on when it is dark and a vistor stands on the doormat.

(a) What sensors should she use?

.....

..... [2]

(b) She decides that she needs two gates. Name them.

.....

..... [2]

(c) Draw the logic circuit she should use.

[4]



TOTAL / 8

Medium Demand Questions QUESTIONSHEET 13

A central heating system is controlled by a timer mechanism so that the boiler is switched on at specific times.

(a) Draw a simple flow chart of this control system.

[2]

(b) (i) Suggest a possible problem with this open loop system.

.....

.....

..... [2]

(ii) What is needed to change this to a closed loop system.
Add your modifications to the flow chart in (a).

.....

.....

..... [3]



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Medium Demand Questions QUESTIONSHEET 14

An alarm system is to be designed for a large commercial greenhouse.
If the temperature in the greenhouse drops an alarm must be activated.

(a) What inputs should be used?

.....

..... [2]

(b) What logic gate would be needed?

..... [1]

(c) Suggest a suitable output device.

..... [1]

(d) It would be more efficient if the system could be made to operate a heater.
What changes would be needed to achieve this?

.....

..... [3]



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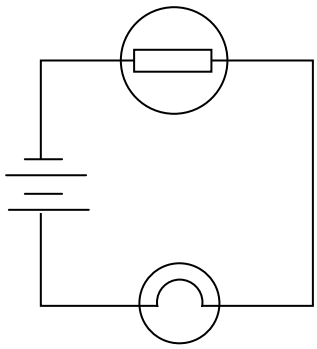
*GCSE PHYSICS* **ELECTRONIC CONTROL**

Medium Demand Questions QUESTIONSHEET 15

The diagram below shows a simple circuit containing a light-dependent resistor (LDR).



(a) (i) What happens to the resistance of the LDR when light falls on it?

..... [1]

(ii) What happens to the voltage across the lamp when light falls on the LDR?

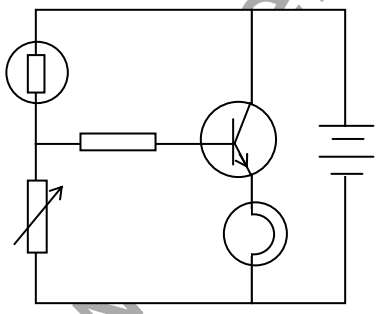
..... [1]

(iii) How can this circuit be modified to tell a blind person that a light has been turned on?

.....

..... [2]

(b) A circuit to switch on street-lights as it gets dark is shown below.



(i) Why is a variable resistor included in the circuit?

..... [1]

(ii) Explain why the lights come on as darkness falls.

.....

.....

.....

..... [3]

TOTAL / 8

Medium Demand Questions QUESTIONSHEET 16

A machine will not operate unless a safety guard is in place first.

(a) Draw circuit diagrams to show how this could be achieved

(i) without the use of electronic components,

[2]

(ii) Using an AND gate.

[2]

(iii) What are advantages of the electronic system?

.....

..... [2]

(b) What components would you need to build a circuit to warn a market gardener that the temperature of his greenhouse is too low at night?

.....

.....

..... [3]



TOTAL / 9

Low Demand Questions QUESTIONSHEET 17

An electronic system is made up of three sections:

(a) Write in the name of each section. [3]

(b) Give one example of a component that could be used in

(i) the first section

..... [1]

(ii) the last section

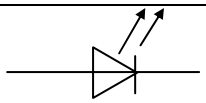
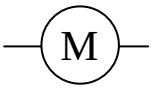
..... [1]



TOTAL / 5

Low Demand Questions QUESTIONSHEET 18

Complete the following table which shows various output devices:

| *Name* | *Symbol* | *What is the output?* |
|---|---|---|
| LED |  | |
| | | Sound |
| Motor |  | |

[4]



TOTAL / 4

Low Demand Questions QUESTIONSHEET 19

LEDs are used in electronic circuits.

(a) What does LED stand for?

..... [1]

(b) LEDs are often used as indicator lamps on computers, television sets etc.

List three reasons why an LED is better than an filament bulb in these circumstances.

.....

.....

..... [3]

(c) LEDs, which are used for digital displays are long and thin.

(i) How many of these LEDs are needed to display all the numbers from 0 to 9?

..... [1]

(ii) Draw the numbers 4 and 6 as they would appear in an LED digital display.

[2]

(iii) Explain why the number eight always shows when the digital display is changing rapidly.

.....

..... [2]



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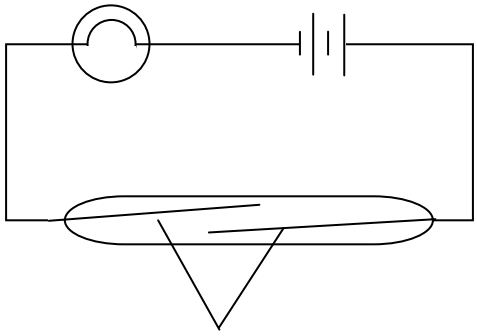
Low Demand Questions QUESTIONSHEET 20

A reed switch consists of two thin iron rods in a glass tube.
Reed switches can have the rods separated (normally open) or touching each other (normally closed).
In a normally open reed switch, a magnet brought near to it closes the rods.

(a) Look at the circuit below.




(i) What will you see when a magnet is brought near the reed switch?

..... [1]

(ii) What will happen when the magnet is moved away again?

..... [1]

(b)(i) How can a reed switch be used as part of a burglar alarm?

.....

.....

..... [3]

(ii) How can a reed switch be used to turn the power off when a microwave door is opened?

.....

.....

..... [3]



TOTAL / 8