AQA A-Level Physics

13.5 Digital Signal Processing

Flashcards

What is a logic gate?

What is a logic gate?

An electronic switch that performs a logical function. It gives a 0 or 1 output depending on the logic states of its input.

Name the 6 different types of logic gate.

Name the 6 different types of logic gate

NOT, NAND, AND, OR, NOR, EOR.

What does a truth table list?

What does a truth table list?

All logical input states to a logic gate with the corresponding output.

What is Boolean algebra?

What is Boolean algebra?

A mathematical way to describe logic circuits with logical rules so that truth tables of combinations of logic gates can be determined.

What does the following notation mean?

$\overline{A}$, A • B, A + B

What does the following notation mean?

$\bar{A}$, A.B, A+B

$\bar{A}$ = **not** A

A • B = A **and** B

A + B = A **or** B

What does the output of a sequential logic circuit depend on?

What does the output of a sequential logic circuit depend on?

The sequence of previous states of the inputs.

What is the D-type flip-flop?

What is the D-type flip-flop?

A basic component of sequential logic circuits: it transfers the data input value to its output on the positive edge of a clock pulse or its output will not change.

How can counting circuits that count in binary be formed?

How can counting circuits that count in binary be formed?

By connecting D-type flip flops. Using Q outputs, the counter counts up, and using $\overline{Q}$ outputs, the counter counts down.

What is a Johnson counter?

What is a Johnson counter?

A counter formed from n D-type flip-flops, where the Q output of the last flip-flop is fed back to the input of first flip-flop.

How does a Johnson counter work?

How does a Johnson counter work?

Feeding back the Q output causes a bit pattern to be shifted along with each clock pulse and repeated after a certain count.

What is a modulo-n counter?

What is a modulo-n counter?

A counter which counts to a chosen number by detecting the number's unique logic state using external logic gates, then sending an output to reset the count.

What is a BCD counter?

What is a BCD counter?

A type of modulo-n counter where n = 10 and it counts in binary from 0-9 (decimal) then resets.

What are Astables?

What are Astables?

Oscillator circuits producing clock pulses for counter circuits.

What is a clock pulse?

What is a clock pulse?

A continuous ON-OFF signal with a constant period.

How can the clock rate (pulse frequency) be calculated from the pulse period?

How can the clock rate (pulse frequency) be calculated from the pulse period?

It is the reciprocal of the period (1 / period).

What is meant by the pulse width (mark)?

What is meant by the pulse width (mark)?

The time for which a pulse is ON.

What is the duty cycle?

What is the duty cycle?

The percentage of time the pulse is ON

Duty cycle = (ON time / period) x 100

What is the mark to space ratio?

What is the mark to space ratio?

ON time / OFF time

How can the pulse frequency of an astable be determined?

How can the pulse frequency of an astable be determined?

Using an external RC network.