

Shift Registers

- 1. What is a shift register? what are they used for?
- 2. Compare and contrast a register with a shift register.
- 3. What is the difference between serial data and parallel data?
- 4. What are the four main classifications of shift registers? explain the benefits of each.
- 5. Design a synchronous 5-bit shift register that shifts data from right to left instead of left to right.
- 6. What is a universal shift register?

Graphic Equalizers

- 1. Explain, in your own words, what a graphic equalizer is and what its purpose is.
- 2. If you wish to lower the bass of a specific audio, which frequency band(s) would you change and how would you change them to decrease how loud the bass is.
- 3. Which frequency band is more likely to detect a high pitch sound? 400 Hz or 6.25 kHz? Explain.



Solutions

Shift Registers

Question 1

A shift register is a collection of flip-flops connected to each other with the purpose of storing multibit data. These registers shift the data through parallel or serial communication.

Question 2

In contrast, a register stores multibit data while a shift register transfers this stored data out through either parallel or serial communication. In comparison, a register and shift register both are composed of a collection of flip-flops.

Question 3

Serial data is one bit at a time getting shifted one by one by the shift register while parallel data is various bits being inputted and shifted simultaneously by the shift register.

Question 4

The four main classifications of shift registers are serial in serial out, serial in parallel out, parallel in serial out, and parallel in parallel out shift registers. The benefit of the serial in serial out shift register is that it helps in delaying a clock by several clock cycles. The benefit of serial in parallel out shift register is that it can demultiplex data, which is helpful when it comes to expanding I/O ports and communication lines. The benefit of the parallel in serial out shift register is that it can multiplex data and convert parallel communication lines into a single serial communication line. Finally, the benefit of the parallel in parallel out shift register is that the transfer of data is not affected by any delays in clock cycles.

Question 5



Question 6



A universal shift register is able to input data in and output data out either in a serial or parallel fashion.

Graphic Equalizer

Question 1

A graphic equalizer is an audio control device that is made for improving the sound quality of a speaker, mainly to improve the clarity of the audio signal.

Question 2

If the bass of a specific song is too loud, we could lower the amplitude of the lower band frequencies to even them out with the other higher frequencies, generating a clearer signal with less bass.

Question 3

6.25 kHz. This is because higher frequencies produce higher pitch sounds.