

By OnlineInterviewQuestions.com

Analog Electronics Interview Questions

Q1. What is Analog Communication?

Analog Communication is a data transmitting technique used to transmit data including video, audio, electrons, image etc. An analog signal is a continuous time-varying signal which represents a time-varying quantity.

Q2. List different parts of a Communication System?

There are five main parts of the communication system:

1. **Message:** Message is the data which needs to be sent .It can be in any form like text, audio, number, video, images.
2. **Sender:** As the name suggests is the device that sends the message. It can be a computer, telephone handset, workstation, video camera and so on.
3. **Receiver:** The device where the message is received is called a receiver. It can be a computer, telephone handset, workstation, video camera and so on.
4. **Transmission medium:** It is a physical path in the data communication network by which the data travel to its destination. Source occupies the one end to send data whereas receives use another end to receive the data. Examples of mediums are twisted-pair cable, coaxial cable, fibre-optic cable etc.
5. **Protocol:** It is a set of rules that regulates the data communication. It is an agreement between the two devices for successful communication. Without the protocol, it is not possible to communicate even though the devices are connected. It handles a lot of things like how the data will be sent or traveled, to ensure data is received or not and many others.

Q3. What are types of Signals?

Signalling is a source of energy that used to convey the information. Information can be shared by means like sounds, action, gestures etc.

Based on their amplitude: -

- **Analog Signal** – The value of the amplitude in the analog signal has infinite value.
- **Digital Signal** – The value of the amplitude in the Digital signal can only have finite and discrete values.

Based on their horizontal axis (time axis) of the signal:-

- **Continuous-time signal**- It is a type of signal whose value (amplitude) exists for every fraction of time t.
- **Discrete-time signal**- It exists only for a discrete value of time t.

Based on “determination by mathematical equation:-

- **Deterministic Signal:** These signals are those signals that are determined by a mathematical formula.
- **Non- deterministic Signal:** These signals are random and they are not defined by any mathematical equation.

Based on symmetry:-

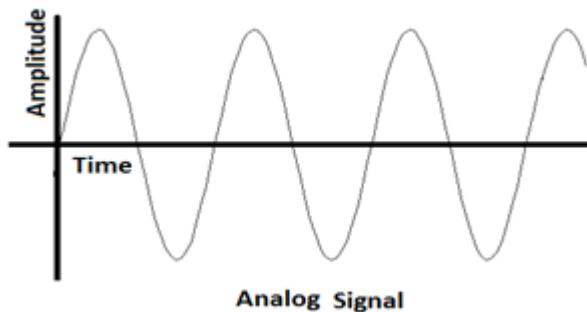
- **Even signals** – These signals are symmetric around a vertical axis
- **Odd signals** – These signals are symmetric about the origin.

Based on power & Energy:-

- **Energy Signal**- These signals have finite energy.
- **Power signal**– These signals have finite power.

Q4. What is an Analog Signal?

A continuous signal in which a one-time varying quantity represents another time-based variable is called an **Analog signal**. These signals work with a natural phenomenon, for example a volcano, speed of wind, weight, frequency, earthquake, lighting etc.



Q5. What is Aperiodic Signal and periodic Signal?

- **Periodic Signal:** A periodic signal always repeats over a cycle of time or regular interval of time. If a periodic signal repeats its pattern after a period it is called a periodic signal. A function e.g. $f(x)$ here can be periodic if and only if it satisfies the following equation..

$$f(x + p) = f(x)$$

Example: The sinusoidal signal is periodic having periodicity value of 2?

- **Aperiodic Signal:** It is a signal which does not repeat its pattern over a period. For example, the signal created by a telephone when one or two words are pronounced is aperiodic.

Q6. What is Modulation?

A process of encoding message source into information which is suitable for transmission is called **Modulation**. This is achieved by altering the characteristics of a wave. There are several forms of modulation based on the characteristics they change. Most of the common characteristics are frequency, amplitude, phase, pulse duration and pulse sequence

Q7. Enlist some advantages of Modulation?

Some of the Advantages of implementing modulation are mentioned below: -

- Frequency of the radiated signal is inversely proportional to the size of the antennae. So, by increasing the frequency of the signal with the help of the modulation will certainly reduce the size of the antenna.
- Signals from different sources are conveyed from a common channel at the same time with the help of multiplexers. If the bandwidth of all these signals is the same then there would be interference and the signal or data cannot be sent properly. Therefore for proper functioning, speech signals are modulated to different carrier frequencies so that the receiver tunes them to desired bandwidth.
- The quality of the reception improves a lot because of the modulation.
- Modulation plays a key role in bringing the wireless system in the communication system.

Q8. What are different types of Modulation?

There are three types of modulation which are mentioned below:

1. **Amplitude modulation:** As the name suggests, amplitude modulation is used to modulate the amplitude of the signal. The amplitude of the carrier wave varies in accordance with the modulating signal.
2. **Frequency modulation, FM:** In frequency modulation, the form of modulation varies the frequency in accordance with the modulating signal. This type of modulation is used in various applications like telemetry seismic prospecting, radio, radar and so on.
3. **Phase modulation:** The carrier phase is varied in line with the data signal. In this modulation, frequency changes whenever the phase is changed.

Q9. Please Explain Square Law Modulator?

Q10. What are Demodulator? List its Types?

In contrast to modulation, this process is used to extract the original information-carrying signal from a modulated carrier wave. It is used to recover the original message from the modulated carrier wave.

Q11. What are Transmitters?

Transmitters are used to send out the data in the form of radio waves in a particular band of the electromagnetic spectrum so that required specific communication meet up, be it for voice or general data. Information sent by the transmitter is in the form of an electronic signal. It can be video from a TV camera, audio from a microphone, or a digital signal for wireless networking devices.

Q12. What is a Receiver?

A receiver is a device that selects a particular signal from the collection of signals received from a communication channel. It collects the signal, recovers it and delivers it to the user.

Q13. What is Sampling?

It is the phenomenon of changing an analog signal to a discrete signal. For example, if a source produces an analog signal, and if it needs to be discretized in 1s and 0s, this can be done by sampling.

Q14. What do you understand by FM and classify FM?

FM stands for frequency modulation is a technique used to encode the information on a specific signal. In this, the form of modulation varies the carrier wave frequency in accordance with the modulating signal.

There are two types of FM:

1. **Narrowband FM:** Narrow-Band FM means that the modulated wave has a narrow bandwidth. $m(t) = A_m \cos(2\pi f_m t)$
2. **Wideband FM:** Wideband FM is used for better signal quality. This is used in an application where the modulation index either equals to or greater than 1.

Q15. What are advantages of Super Heterodyning?

Super heterodyning is a device that converts high frequency to low frequency. There are many advantages of Super Heterodyning.

Some of them are mentioned below: -

1. **Cost:** Lower frequency component is cheaper compared to the higher frequency therefore with the help of superheterodyne, these lower frequency components can be used easily.
2. **Superior sensitivity:** It is easy to filter the unwanted signal at IF as compared to the RF, therefore, Superheterodyne provides the superior sensitivity.
3. Another advantage of using Super heterodyning is that various components can be designed for a fixed frequency which is cheaper and easier as compared to the designing wideband components.

Q16. What Is Amplitude Modulation?

Amplitude modulation is defined as the amplitude of a carrier wave varies in line with the characteristics of a message signal. The signal can be musical sound, vocal sound.

Q17. What Is Pulse Position Modulation?

Pulse Position Modulation (PPM) defines a signalling scheme that allows in the transmission of multiple bits per symbol. Continuous signals are sampled at a specific interval in pulse modulation.

Q18. Explain the principle of PPM?

The principle used in PPM is that the width and the amplitude of the pulse remain constant but the position varies in line with the amplitude of the modulating signal.

Q19. What is PAM in practical circuits?

Q20. What is pass and stop band?

- **Bandpass filter:** A bandpass filter includes an LPF and a high pass. It permits only selectable frequency to pass and block the above and below frequencies. Cut off frequency of the LPF is higher in comparison with the cut off frequency of the high pass filter. Because of this, it allows only a specific range of frequency to pass.
- **Bandstop filter:** Bandstop filter or notch filter is opposite to Bandpass filter as they block the specific range of frequency and allows the rest of frequency to pass through. It is reverse of the bandpass filter and can be designed simply using the same input at a high pass and an LPF.

Q21. What is a precision rectifier?

The precision rectifier is acquired with the help of one or more than one operation amplifier to obtain a circuit that behaves like an ideal diode and rectifier. There are two methods to design a precision rectifier. First one is amplifying the AC signal and rectifying it or performing both steps at once with a single amplifier. The latter is more convenient to use.

Q22. What is DAC?

DAC is known as **Digital to Analog Converter** is a device that changes binary values (0s and 1s) to a set of continuous analog to produce the output it is important to convert the data that is understandable with the help of devices like DAC. voltages. DAC is also known as D/A or D2A. As we know, a computer uses binary language to operate, therefore

Q23. What are RF and microwave filters?

The **Microwave** and **RF filters** are used to pass or reject signals by frequency. The function of the filter is used to determine the quantity of insertion loss. It also checks the phase shift for signals that pass through the filter. There are two main types of RF and Microwave filter which are Bandpass filter and Band reject filter.

Q24. What are harmonics?

When a musical instrument is playing a note, it is the fundamental pitch that we are hearing. This pitch is joined with a series of frequencies which are usually heard as a single tone. Harmonics are those particular frequencies which are integer multiples of the fundamental pitch's frequency.

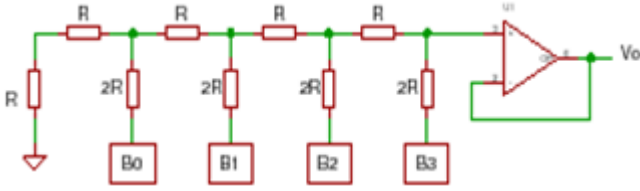
Q25. What is a multivibrator?

Multivibrator is an electronic device that generates a non-sinusoidal waveform. The produced wave can be in any form like a triangular wave, sawtooth wave, square wave, ramp wave, rectangular wave etc.

Q26. What is an R-2R ladder network?

An R-2R resistor ladder network is used to transform the parallel digital symbol into an analog voltage. It follows the principle of superposition where you can switch on the binary input if you are willing to add more voltage at the output.

This diagram shows the binary analogue and output. The below ladder can be extended to any length:



Q27. What is a Schmitt trigger?

A logic input type that gives hysteresis or two various threshold voltage levels for falling and a rising edge is called Schmitt trigger. It is very useful to avoid errors in noisy input signals where the only aim is to get square wave signals. Schmitt trigger transforms an analog signal or sinusoidal signal to a digital signal. The output transition from low to high and high to low occur at various thresholds.

Q28. What are active filters?

Active filters are those filters that contain active components like operational amplifiers along with passive elements like capacitor and resistor. Active filter used to amplify the output signal by using the power from an external power source.

Q29. What is a precision full wave rectifier?

The precision full-wave rectifier accepts the ac signal at the input. Then it inverts either the positive half or the negative half. At the output, this full-wave rectifier provides both the non inverted and inverted halves. It supplies both the cycles in one direction. The diagram is below:

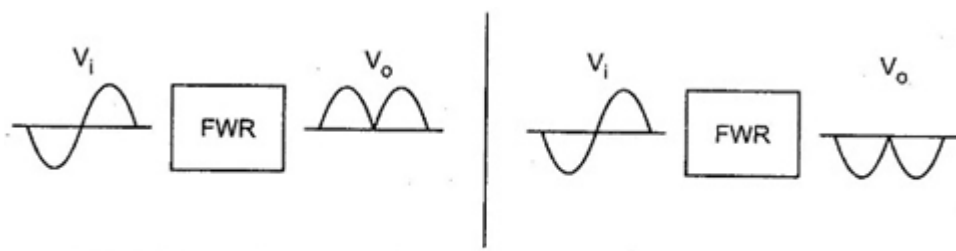


Fig. 2.62 Positive and negative full wave rectifiers

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