

Copilot

Sure, here are the viva questions with concise answers for each experiment:

1. Signal Operations and Generations

1. **What is a signal generator?**
 - A device that produces various types of electrical waveforms over a range of frequencies.
2. **Explain the working principle of an oscilloscope.**
 - It visualizes electrical signals, showing their amplitude, frequency, and phase.
3. **What are the common waveforms generated?**
 - Sine, square, and triangular waves.
4. **How do you measure frequency with an oscilloscope?**
 - By counting the number of cycles per second on the display.
5. **What is modulation?**
 - The process of varying a carrier signal to transmit data.
6. **Describe demodulation.**
 - Extracting the original information from a modulated carrier signal.
7. **Difference between amplitude and frequency modulation?**
 - Amplitude modulation varies signal strength; frequency modulation varies signal frequency.
8. **How to determine signal amplitude on an oscilloscope?**
 - Measure the vertical height of the waveform.
9. **Applications of signal generators?**
 - Used in testing and designing electronic circuits.
10. **What is phase shift?**
 - The difference in phase between two signals.

2. Integrator and Differentiator

1. **Function of an integrator circuit?**
 - Produces an output proportional to the integral of the input signal.
2. **How does a differentiator work?**
 - Produces an output proportional to the derivative of the input signal.
3. **Components of an integrator?**
 - An op-amp with a capacitor in the feedback loop.
4. **Role of the capacitor in an integrator?**
 - It accumulates charge, performing the integration.
5. **Applications of integrators?**
 - Used in analog computers and signal processing.
6. **Output of a differentiator to a square wave?**
 - Produces sharp spikes at the transitions.
7. **Effect of high-frequency noise on a differentiator?**
 - Amplifies the noise, making the output unstable.
8. **How to stabilize a differentiator?**
 - Add a small capacitor in parallel with the feedback resistor.
9. **Output of an integrator with a square wave input?**
 - Produces a triangular waveform.
10. **Improving integrator performance?**
 - Use precision components and proper filtering.

3. Inverting and Non-Inverting Amplifiers

1. **Difference between inverting and non-inverting amplifiers?**
 - Inverting amplifies with phase inversion; non-inverting amplifies without phase inversion.

2. **Gain calculation for an inverting amplifier?**
 - $(V_{out} = - (R_f / R_{in}) V_{in})$.
3. **Significance of the feedback resistor?**
 - Determines the gain of the amplifier.
4. **Phase relationship in an inverting amplifier?**
 - Output is 180 degrees out of phase with the input.
5. **Phase maintenance in a non-inverting amplifier?**
 - Output is in phase with the input.
6. **Applications of inverting amplifiers?**
 - Used in signal inversion and summing amplifiers.
7. **Achieving desired gain in a non-inverting amplifier?**
 - Adjust the ratio of feedback and input resistors.
8. **Effect of input impedance?**
 - High input impedance in non-inverting; low in inverting.
9. **Output of a non-inverting amplifier with a sine wave?**
 - A sine wave with amplified amplitude.
10. **Creating a voltage follower?**
 - Use a non-inverting amplifier with unity gain.

4. Zener Diode as a Line and Load Regulator

1. **Principle of operation of a Zener diode?**
 - Maintains a constant voltage in reverse bias once breakdown voltage is reached.
2. **How does a Zener diode maintain constant voltage?**
 - By operating in the breakdown region.
3. **Line regulation using a Zener diode?**
 - Stabilizes output voltage against input voltage changes.
4. **Load regulation with a Zener diode?**
 - Maintains output voltage despite load current variations.
5. **I-V characteristics of a Zener diode?**
 - Sharp breakdown voltage in reverse bias.
6. **Determining Zener voltage?**
 - Measure the voltage across the diode in reverse bias.
7. **Applications of Zener diodes?**
 - Used in voltage regulation and protection circuits.
8. **Effect of series resistor in a Zener regulator?**
 - Limits current through the Zener diode.
9. **Input voltage below Zener voltage?**
 - Zener diode does not conduct, and output voltage drops.
10. **Significance of the breakdown region?**
 - Ensures stable voltage regulation.

Feel free to ask if you need more details or have any other questions!