12 Lecture - CS302

Important Subjective

1. **What is a comparator and what is its primary function?**
   Answer: A comparator is a digital circuit that compares two input signals and determines their relationship, typically whether one signal is greater than, equal to, or less than the other. Its primary function is to provide a high or low output signal based on the comparison of the input signals.

2. **What are the key parameters to consider when selecting a comparator?**
   Answer: The key parameters to consider when selecting a comparator are power consumption, supply voltage, input offset voltage, response time, and operating temperature.

3. **What is a hysteresis circuit and what is its function in a comparator?**
   Answer: A hysteresis circuit is a feedback mechanism that provides positive feedback to the comparator. Its function is to reduce noise and increase the stability of the output signal.

4. **What is the difference between an inverting and a non-inverting comparator input configuration?**
   Answer: In an inverting input configuration, the input signal is applied to the inverting input of the comparator. In a non-inverting input configuration, the input signal is applied to the non-inverting input of the comparator. The output of an inverting comparator is opposite in polarity to the input signal, while the output of a non-inverting comparator is in the same polarity as the input signal.

5. **How does a comparator differ from an operational amplifier?**
   Answer: A comparator is designed to compare two input signals and provide a high or low output signal based on the comparison, while an operational amplifier is designed to amplify and condition an input signal.

6. **What is the function of a comparator output stage?**
   Answer: The function of a comparator output stage is to provide the output signal with sufficient drive capability to operate downstream components.

7. **What is the difference between a single-ended and a differential comparator input configuration?**
   Answer: In a single-ended input configuration, the input signal is applied to one input of the comparator, while in a differential input configuration, the input signals are applied to both inputs of the comparator.

8. **What is input offset voltage and how does it affect comparator performance?**
   Answer: Input offset voltage is the voltage difference between the two input terminals of the comparator. It can cause errors in the output signal and reduce the accuracy of the comparator.

9. **What is a Schmitt trigger and how does it differ from a standard comparator?**
   Answer: A Schmitt trigger is a comparator with hysteresis, which provides a stable output signal even in the presence of noise or other disturbances. It differs from a standard comparator in that it has two different threshold voltages for its input signal.

10. **What is the function of a comparator in a control system?**
    Answer: The function of a comparator in a control system is to compare the actual output signal with a reference signal and generate an error signal that drives the system towards the desired output signal.