1. What is a sequence generator circuit? Application of sequence generator?
   A sequence generator circuit is an electronic circuit designed to produce a specific sequence of signals or numbers at its output. These sequences can be periodic or pseudo-random and are typically generated by a combination of logic gates, flip-flops, counters, or microcontrollers.
   They are used in several electronic circuits like
   - Digital Clocks: To generate time sequences for displaying hours, minutes, and seconds.
   - Counters: In digital systems for counting events, such as in digital meters or frequency counters.
   - Data Communication: For generating address or control sequences in communication protocols.
   - Test Equipment: To produce test patterns for verifying the functionality of other digital circuits.
   - Control Systems: In automation and control systems to sequence operations or states.
   - Random Access Memory (RAM): Used in addressing sequences for accessing memory locations.
2. What is a transmission gate in digital circuit?
   A transmission gate in digital circuits is a type of bidirectional switch that allows or blocks the passage of a signal between its source and drain terminals. It is typically implemented using a combination of NMOS and PMOS transistors in parallel.
3. What is a pass transistor logic circuit? Advantages of using pass transistor logic.
   Pass Transistor Logic (PTL) is a type of digital logic circuit where transistors are used as switches to control the passage of signals through the circuit. In PTL, a transistor's gate is used to either allow or block the signal from passing through, rather than using standard logic gates like AND, OR, and NOT.
4. Why are most interrupts active low?
   Noise Immunity:

   - Low Voltage Levels: A low voltage (logic 0) is less susceptible to noise compared to high voltage (logic 1). Active low signals are less likely to be erroneously triggered by noise.

   Power Consumption:

   - Lower Power: In many logic families, a low signal state often requires less power than a high signal state, which can reduce power consumption in digital circuits.

   Electrical Characteristics:

   - Transistor Design: Many digital circuits, especially those using TTL logic, are designed with characteristics that make them more stable and reliable when dealing with low-level signals.

   Simplified Logic Levels:

   - Pull-Up Resistors: Active low signals often use pull-up resistors to ensure that the default state of the line is high. When the interrupt is asserted (active), the line is pulled low, simplifying the design and ensuring a clear default state.
5. Define pair, quad, octet.
   - Pair: A group of two items (e.g., two bits or two bytes).
   - Quad: A group of four items (e.g., four bits or four bytes).
   - Octet: A group of eight bits (equivalent to one byte).
6. Define fan-in and fan-out.
   Fan-in: The number of input signals that a logic gate or circuit can handle.
   Fan-out: The number of output loads that a logic gate or circuit can drive without degrading performance.
7. What is power dissipation?

Power dissipation refers to the process of converting electrical power into heat within a component or circuit. It occurs when electrical energy is used to perform work or overcome resistance, resulting in heat generation.

8. What is metastability? What are its effects?
   Metastability is a condition in digital circuits, particularly in flip-flops and latches, where a signal is in an intermediate state and cannot resolve to a stable high or low value within the expected time. This occurs when the input to a flip-flop changes too close to the clock edge or when the timing constraints are not met.
   Metastability causes:
   - Unpredictable Behavior: The output of a flip-flop may be unpredictable or indeterminate, potentially leading to erroneous data being processed or transmitted.
   - Increased Delay: Metastability can cause increased propagation delays, affecting the timing performance of the circuit.
   - System Failures: In digital systems, metastability can cause system-level failures or malfunctions if the unpredictable states propagate through the system.
   - Error Rates: Higher error rates in data processing or communication due to unreliable signal transitions.
9. What is an arbiter? Explain its operation.
   An arbiter is a circuit or algorithm used to manage access to a shared resource or critical section among multiple requesting entities in a digital system. It ensures that only one requester at a time is granted access to the resource, thus preventing conflicts and ensuring orderly access.
   Operation of an Arbiter:

   1. Request Inputs:
      - The arbiter receives multiple requests from different sources or devices that want access to the shared resource.
   2. Priority Resolution:
      - It evaluates the requests based on a predefined priority scheme or arbitration policy. The policy could be fixed priority, round-robin, or any other method that determines which request should be granted access.
   3. Grant Output:
      - The arbiter generates a grant signal for the selected requester, allowing it to access the shared resource.
   4. Control Access:
      - Once a request is granted, the arbiter ensures that no other requester can access the resource until the current request is completed or released.
   5. Handle Conflicts:
      - The arbiter manages any potential conflicts or contention between requests, ensuring that only one access occurs at a time.