

DLCD Viva

1. What is the difference b/w Latch And Flip-flop?

The difference between latches and Flip-flop is that the latches are level triggered and flip-flops are edge triggered. In latches level triggered means that the output of the latches changes as we change the input and edge triggered means that control signal only changes its state when goes from low to high or high to low.

Latches are fast whereas flip-flop is slow.

2. What is a Logic gate?

The basic gates that make up the digital system are called a logic gate. The circuit that can operate on many binary inputs to perform a particular logic function is called an electronic circuit.

3. What are the basic Logic gates?

There are three basic logic gates-

1. *AND gate.*
2. *OR gate.*
3. *NOT gate.*

4. Which gates are called as Universal gate and what are its advantages?

The Universal gates are NAND and NOR. The advantages of these gates are that they can be used for any logic calculation.

5. What are the applications of the octal number system?

The applications of the octal number system are as follows:

1. *For the efficient use of microprocessors.*
2. *For the efficient use of digital circuits.*
3. *It is used to enter binary data and display of information.*

6. How many types of number system are there?

There are four types of number system:

1. *Decimal Number System.*
2. *Binary Number System.*
3. *Octal Number System.*
4. *Hexadecimal Number System.*

7. What is meant by K-Map or Karnaugh Map?

K-Map is a pictorial representation of truth table in which the map is made up of cells, and each term in this represents the min term or max term of the function. By this method, we can directly minimize the Boolean function without following various steps.

8. Name the two forms of Boolean expression?

The two forms of Boolean expression are:

- 1. Sum of products (SOP) form.*
- 2. The Product of sum (POS) form.*

9. What are the limitations of the Karnaugh Map?

The limitations of Karnaugh Map are as follows:

- 1. It is limited to six variable maps which means more than six variable involving expressions are not reduced.*
- 2. These are useful for only simplifying Boolean expression which is represented in standard form.*

10. What are the advantages and disadvantages of the K-Map Method?

The advantages of the K-Map method are as follows-

- 1. It is an excellent method for simplifying expression up to four variables.*
- 2. For the logical simplification, it gives us a visual method.*
- 3. It is suitable for both SOP and POS forms of reduction.*
- 4. It is more suitable for classroom teachings on logic simplification.*

The disadvantages of the K-Map method are as follows:

- 1. It is not suitable when the number of variables exceeds more than four.*
- 2. For Computer reduction, it is not suitable.*
- 3. We have to take care while entering the numbers in the cell-like 0, 1 and don't care terms*

11. What are the applications of Flip-Flops?

The applications of flip-flops are:

- 1. Flip-flops are used as the delay element.*
- 2. These are used for Data transfer.*
- 3. Flip-flops are used in Frequency Division and Counting.*
- 4. Flip-Flops are used as the memory element.*

12. What is Gray code?

Gray Code is also known as Reflected Binary code. It is a binary system in which each successive pair of numbers differs with only 1-bit data. These codes are very useful in binary numbers generated by hardware that can produce an error during the transition from one number to another.

13. Describe Encoder and Decoder.

The encoder and decoder are combinational logic circuits. An encoder is a device that converts analog or active data into digital or coded data. But the decoder's operation is exactly the reverse of the encoder. A decoder is a device that converts the original signal as output from the coded input signal and converts n lines of input into 2^n lines of output.

14. What are the types of Logic gates other than the basic ones?

Two universal gates, and a few other combinational logic gates in digital electronics.

Universal Gates:

- NAND gate
- NOR gate

Other Gates:

- XOR gate
- XNOR gate

15. Explain the Quine-McCluskey method?

The Quine McCluskey method or tabulation method is used to minimize the Boolean functions. This method simplifies boolean expression into the simplified form using prime implicants. This method is convenient to simplify when boolean expressions have more than 4 input variables.

16. Define Hold time?

The last time at which the power level becomes stable after triggering the watch pulse in order to dependably clock into the flip flop is called the Hold time.

17. Define Fall time?

Fall time is the time that is necessary to modify the power level from 90% to 10%.

19. Define Full- Adder?

Full-adder is the circuits that carry out the adding up of three bits. It has three inputs A, B and a hold bit. Full adders are represented with AND, OR and XOR reason gate.

20. What do you mean by Multiplexer?

The multiplexer is a digital control which combines all the digital information from numerous sources and gives one output.

21. What is Half-Adder?

Half-adder is the circuits that perform the addition of two bits. It has two inputs A and B and two outputs S (sum) and C (carry). It is represented by XOR logic gate and an AND logic gate.

22. What are shift registers?

*A **Register** is used to store information. A register is a group of flip-flops that are connected in series and used to store multiple bits of data.*

*The information stored within registers can be transferred with the help of **shift registers**. Shift Register is also a group of flip-flops that is used to store multiple bits of data. The bits stored in shift registers can be moved within the registers and in/out of the registers by using clock pulses. An n-bit shift register can be obtained by joining n flip-flops.*

Shift registers are basically of 4 types:

1. *Parallel In parallel Out shift register*
2. *Parallel In Serial Out shift register*
3. *Serial In Serial Out shift register*
4. *Serial In parallel Out shift register*

23. What is a counter?

It is a device that stores or displays the no of times a particular event or process has occurred, often in relationship to a clock signal. Counters are used in digital electronics for counting purposes, they can count specific events happening in the circuit.

Counters are divided into two categories:

1. *Asynchronous counter*
2. *Synchronous counter*

24. What are the Flip-Flops?

Flip-flops are the basic digital memory circuit. It has two states logic 1(High) and logic 0(low) states. A flip-flop is a sequential circuit that consists of a single binary state of information or data. It is also known as a Bistable Multivibrator. Flip-flops are used as the delay element they are also used for Frequency Division, Data transfer, Counting, and as a memory element.

25. Define Rise Time and Setup time.

- **Rise time:** Time required to change the voltage level from 10% to 90%.
- **Setup time:** The minimum time required to maintain the constant voltage levels at the excitation inputs of the flip-flop device before the triggering edge of the clock pulse reliably clocked in the flip-flop is called the Setup time.

26. Differentiate b/w Combinational & Sequential Circuits.

S.No	Combinational Circuit	Sequential Circuit
1.	The output depends on the present input only and there is no need for feedback for input and output, so a memory element is not required.	The output depends upon both the present input and the present state (previous output), so a memory element is required to save the feedback state.
2.	Clock signals are not required and the combinational circuit is not dependent on time.	Clock signals are required and sequential circuits are dependent on time and clock so it needs triggering.
3.	It is easier to use, design, and handle.	It is more complex to use, design, and handle.
4.	Faster logic circuits.	Slower than combinational circuits.
5.	Elementary building blocks are logic gates only.	Elementary building blocks are Flip-Flops.

27. Difference b/w SOP and POS.

S.No.	SOP	POS
1.	A way of representing boolean expressions as the sum of product terms.	A way of representing boolean expressions as a product of sum terms.
2.	SOP uses minterms. Minterm is a product of boolean variables either in normal form or complemented form.	POS uses max terms. Maxterm is the sum of boolean variables either in normal form or complemented form.
3.	SOP is formed by considering all the minterms, whose output is HIGH(1)	POS is formed by considering all the maxterms, whose output is LOW(0)
4.	It is the sum of minterms. Minterms are represented as 'm'	It is a product of max terms. Max terms are represented as 'M'
5.	Input with value 1 is assumed as the variable itself and input with value 0 is assumed as a complement of the input.	Input with value 1 is assumed as the complement, and input with value 0 is assumed as the variable itself.

28. What is the difference b/w Synchronous and Asynchronous Counters?

S.NO	Synchronous Counter	Asynchronous Counter
1.	All flip-flops are triggered with the same clock simultaneously.	Different flip-flops are triggered with different clocks, not simultaneously.
2.	A synchronous Counter is faster than an asynchronous counter in operation.	The asynchronous Counter is slower than the synchronous counter in operation.
3.	Also known as Parallel Counter.	Also known as Serial Counter.
4.	Examples: Ring counter , Johnson counter .	Examples: Ripple UP counter and the Ripple DOWN counter.
5.	In synchronous counter, propagation delay is less.	In the asynchronous counter, there is a high propagation delay.

29. Explain the types of Flip Flop.

Flip-flops are the basic digital memory circuit. It has two states logic 1(High) and logic 0(low) states. A flip-flop is a sequential circuit that consists of a single binary state of information or data. It is also known as a Bistable Multivibrator.

Types of flip-flops:

1. *RS Flip Flop*

- 2. JK Flip Flop
- 3. D Flip Flop
- 4. T Flip Flop

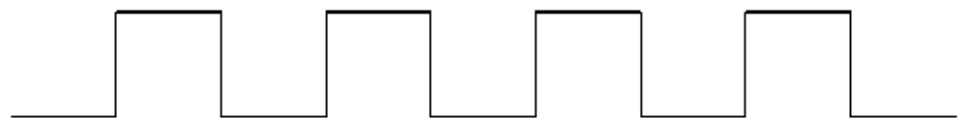
30. Difference b/w PLA and PAL

S.No	PLA	PAL
1.	PLA stands for Programmable Logic Array.	While PAL stands for Programmable Array Logic.
2.	PLA speed is lower than PAL.	While PAL's speed is higher than PLA.
3.	The complexity of PLA is high.	While PAL's complexity is less.
4.	The cost of PLA is also high.	While the cost of PAL is low.
5.	Programmable Logic Array is less available.	While Programmable Array Logic is more available than Programmable Logic Array.
6.	It is less used than PAL.	While it is more used than PLA.

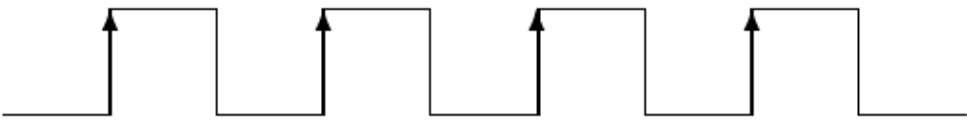
31. What is the difference between level-triggered and edge-triggered circuits?

Level Triggering : In level triggering the circuit will become active when the gating or clock pulse is on a particular level. This level is decided by the designer. We can have a negative level triggering in which the circuit is active when the clock signal is low or a positive level triggering in which the circuit is active when the clock signal is high.

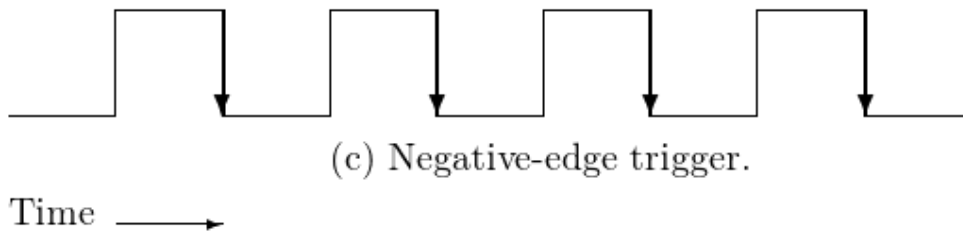
Edge Triggering : In edge triggering, the input signal's sharp edge, which is picked up by the circuit's clock signal, triggers the signal change. The trigger edge is this abrupt edge, and depending on how the circuit is constructed, it may be rising or dropping. The circuit reacts by switching the output signal to the opposing state when it detects the trigger edge.



(a) Level trigger.



(b) Positive-edge trigger.



Edge Triggering	Level Triggering
Edge triggering is based on detecting a sharp edge in the input signal.	Level triggering is based on recognizing a specified signal level.
Edge triggering is frequently used in synchronous circuits, such as counters and flip-flops.	Level triggering is frequently employed in applications that call for continuous monitoring of an input signal, such as data acquisition and control systems.
Edge triggering is particularly helpful in applications that need precise timing.	Level triggering lacks the ability to regulate precise timing.
When edge triggering is used, the output signal is activated when the trigger edge is detected and changes to the opposing state. As long as the input signal is at or above the trigger level.	In level triggering, the output signal will remain in the triggered condition.

32. Types are memories in a digital circuit.

Different types of memories used in the digital circuits are:

1. *Registers: fastest memory*
2. *Primary memory: can be further classified as:*
 - *RAM- random access memory*
 - *ROM- read-only memory*
3. *Secondary memories: this is the slowest one. Ex: magnetic tapes.*

33. Which code is called a minimum change code and why?

A grey code is called a minimum change code. It is called so because only one-bit changes during any transition between two numbers.

34. What is the difference between bit, nibble, byte and word?

A bit is a single binary digit, a nibble is a combination of 4 binary digits, a byte is a combination of 8 binary digits while a word is made up of several bytes.

35. What is CAM?

CAM is called as content accessible memories. It is a special type of RAM. It can perform association operation in addition to the read/write operations performed by the conventional memories.

Points to be remember for Digital Electronics Interview or Viva

- Gray code is also known as minimum change code
- Multiplexer is used for parallel to serial conversion of data

- NAND Gate is known as universal Gate because all the logical functions are realized using it
- NOR Gate with positive logic is always equivalent to NAND Gate with negative logic
- NAND Gate with positive logic is always equivalent to NOR Gate with negative logic
- Gray code is an unweighted code
- BCD code has the advantage that it can be easily converted to and from the decimal code
- BCD code is a weighted code
- BCD code is used in calculators, counters, digital voltmeters, digital clocks etc
- Excess 3 code is an unweighted code
- Excess 3 code is known as self complementing code
- Multiplexer is also known as data selector
- Combinational circuit has no memory elements and output depends only on the current value of the input
- Carry look ahead adder is faster, since carry is generated in parallel at all the stages of addition rather than sequentially as in ripple adder
- Demultiplexers is also known as data distributor
- Demultiplexers is used for serial to parallel conversion of data
- JK flip flop is the modification of RS flip flop that the indeterminate state($S = R = 1$) of the RS flip flop is defined in JK flip flop
- D flip flop is used as a delay switch
- T flip flop is used as a toggle switch
- T flip flop is commonly used as digital counter and frequency divider
- Race around condition is always undesirable
- Race around problem occurs in a circuit because of time delay due to high speed logic
- Race around condition always arises in asynchronous circuits
- Race around condition occurs in JK flip flop to store two bits of information
- The frequency is halved the output of T flip flop
- In shift registers, normally JK flip-flops are used
- A master slave flip flop consists of an RS flip flop followed by a T flip flop
- An asynchronous circuit is generally more difficult to design than a synchronous system
- Asynchronous sequential circuits are difficult to design because of instability
- Shift register can be used to change data from spatial code to temporal code
- Glitch is an unwanted spike in the signal
- Synchronous counter is used for high frequency applications
- Asynchronous counter is used for low frequency applications
- A group of flip flop sensitive to Pulse transition is called as a register
- A group of flip flop sensitive to Pulse duration is usually called as a latch
- For good IC, propagation delay should be minimum
- Synchronous counter is faster than asynchronous counter
- Ring counter requires N flip flops to design Mod N ring counter