CS302 Final Term Notes

Q#1) Define sequential circuit?

Ans: - Digital circuit that use memory element for their operation is known as sequential circuit.

Q#2) Define latches?

Ans: - A latch is a temporary storage device that has two stable states. A latch output can change from one state to the other by applying appropriate inputs.

Q#3) Define bi-stable multivibrators?

Ans: - Flip-Flops are synchronous bi-stable devices, known as bi-stable multivibrator.

Q#4) which flip-flops are used in digital logic circuit?

Ans: - There are generally three types of flip-flops are used in digital circuit. These are as under.

i. S-R edge-triggered flip-flop
ii. D edge-triggered flip-flop
iii. J-K edge-triggered flip-flop

Q#5) Why S-R, J-K and D inputs are known as synchronous inputs?

Ans: - S-R, J-K and D inputs are known as synchronous because the outputs change when appropriate input values are applied at the inputs and clock signal is applied at the clock input.

Q#6) what are the flip-flop operating characteristics?

Ans: - There are the following characteristics if flip-flop. These are as under:

1) Propagation Delay
2) Set-up time
3) Hold time
4) Maximum clock frequency
5) Pulse width
6) Power Dissipation

Q#7) Define propagation delay?

Ans: - The propagation delay is the time interval of time when the input is applied and the output changes.

Q#8) Define set-up time?

Ans: - When a clock transition occurs at the clock input of a flip-flop the output of the flip-flop is set to a new state based on the inputs.

Q#9) Define hold time?

Ans: - The input signal maintained at the flip-flop input has to be maintained for a minimum time after the clock transition for the flip-flop to reliably clock in the input signal. The minimum time for which the input signal has to be maintained at the input is the Hold time of the flip-flop.

Q#10) Define maximum clock frequency?

Ans: - A flip-flop can be operated at a certain clock frequency. If the clock frequency is increased beyond a certain limit the flip-flop will be unable to respond to the fast changing clock transitions, therefore the

flip-flop will be unable to function. The maximum clock frequency $\mathbf{f_{max}}$ is the highest rate at which the flip-flop operates reliably.

Q#11) Define pulse width?

Ans: - A flip-flop uses the clock, preset and clear inputs for its operation. Each signal has to be of a specified duration for correct operation of the flip-flop. The manufacturer specifies the minimum pulse width $\mathbf{t_w}$ for each of the three signals. The clock signal is specified by minimum high time and minimum low time.

Q#12) Define power dissipation?

Ans: - A flip-flop consumes power during its operation. The power consumed by a flip-flop is defined by $P = V_{cc} X I_{cc}$. The flip-flop is connected to +5 volts and it draws 5mA of current during its operation, therefore the power dissipation of the flip-flop is 25 mW.

Q#13) Define 555 timer?

Ans: - The 555 Timer is a versatile and widely used device which can be configured as a mono-stable One-Shot or as an Astable multivibrator. An Astable multivibrator is known as an Oscillator which does not have any stable state.

Q#14) Define Clock skews?

Ans: - One of the most common problems in synchronous circuits is 'Clock Skew'. One type of Clock Skew occurs when the same clock signal arrives at different times at different clock inputs to propagation delay, which causes different flip-flops to change states asynchronously leading to unpredictable outputs.

Q#15) what are the applications of shift registers?

Ans: -The major applications of a shift register are to convert between parallel and serial data. Shift registers are also used as keyboard encoders. The two applications of the shift registers are discussed.

1) Serial-to-parallel converter
2) Keyboard encoder

Q#16) what are the types of memory?

Ans: - There are the two types of memory. These are as under:-

- RAM(Random Access memory)
- ROM(Read only memory)

RAM:-

Ram stand for random access memory. RAM memories do not store permanent data. As soon as the power supply to the memory chip is turned off, the entire data stored in the memory is lost permanently. RAM memories are also known as volatile memories as they lose data when the power is turned off.

Types of RAM: - RAM is divided into two types, Static RAM which uses flip-flops as storage elements and Dynamic RAM which uses capacitors to store binary information.

ROM: -

Rom stand for read only memory. ROM chips retain data permanently even if the power to a ROM chip is turned off. ROM chips are also known as non-volatile memory chips due to their ability to retain data permanently. Since ROM chips are read only, therefore user cannot write any information to

ROM chips. ROM chips are programmed by the manufacturer and contain important information which is required to start (Boot Up) the computer.

Q#17) what are the types of DRAM?

Ans: - There are the three types of DRAM. These are as under:

1. **Fast page mode DRAM**

   Compared to random access read/write, FAST Page Mode is faster where successive columns on the same row are read/written in successively by asserting the $\overline{CAS}$ strobe signal.

2. **Extended data output DRAM**

   The memory in its operation is similar to the FPM DRAM; however the $\overline{CAS}$ signal doesn't disable the D_{OUT} when it goes to its non-asserted State.

3. **Synchronous DRAM**

   The DRAM operations are tied to a clock signal that also times the microprocessor operations. This allows the DRAM to closely synchronize with the microprocessor.

Q#18) what is EPROM?

Ans: - An EPROM is an Erasable PROM. The contents of the memory can be erased and the memory can be reprogrammed. The EPROM uses NMOSFET array with an isolated-gate structure. The isolated gate structure can store a charge for indefinite periods of time.

Types of EPROM

There are two types of EPROM. These are as under: -

- Ultra Violet EPROM (UV EPROM)
- Electrically Erasable EPROM (EEPROM)

Q#18) what the non volatile, high density memory?

Ans: - Following are the non volatile and high density memory. These are as under: -

Memory type	Non volatile	High density	One-Transistor cell	In system write ability
SRAM	No	No	No	Yes
DRAM	No	Yes	Yes	Yes
ROM	Yes	Yes	Yes	No
EPROM	Yes	Yes	Yes	No
EEPROM	Yes	No	No	Yes
FLASH	Yes	Yes	Yes	Yes

Q#19) what are the special types of memory?

Ans: - There are the two special types of memory. These are as under:-

- **FIFO(First in First out)**

  Digital systems receive data or transfer data to devices that are operating at different data rates. A Computer (microprocessor), for example, receives data from the Keyboard as a **user types in the information.**

- **LIFO(Last in First Out)**

  Last In-First out Memory finds applications in computer systems where it is used to implement a stack. The

operation of a stack can be understood by viewing a stack of plates.

Q#20) what is quantized?

Ans: - The process of converting the analogue signal into a digital representation (code) is known as quantization.

Q#21) what is operational amplifier?

Ans: - Operational Amplifier is a linear amplifier which has two inputs (inverting and non-inverting) and one output. It has a high voltage gain, high input impedance and low output impedance. The Op-Amp amplifies the difference signal between its inverted and non-inverted inputs.

Q#22) what is resolution?

Ans: - Resolution is defined as the number of bits that are converted. It is also defined as a reciprocal of the number of discrete steps in the output represented as percentage. The resolution of a 4-bit D/A converter is therefore represented as (1/15) 100 = 6.67%. An 8-bit D/A converter has a resolution of (1/63) 100 = 1.59%.

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