ADE VIVA QUESTIONS :-

Experiment 1:- To implement half wave and full wave rectifier.

1. **What is a rectifier?**

Answer:- A rectifier is a device which converts AC current to DC current.

2. **What are the types of rectifiers?**

Answer:- There are two types of rectifiers:-

i.) Half wave rectifier
ii.) Full wave rectifier

3. **What is the difference between half wave and full wave rectifier?**

Answer:- The major difference between the half wave and full wave rectifier is that half wave rectifies only one-half cycle of the AC signal where as the full wave rectifier rectifies the full cycle of the AC signal.

4. **What is the limits (Period) of Half wave and full wave rectifier?**

Answer:- 0 to pi for half wave and 0 to 2*pi for full wave.

5. **What is the use of resistance is rectifier?**

Answer:- The resistor in series with the diode is used to limit the output current.

6. **What is the application of rectifier?**

Answer:- Following are the some applications of rectifier:-

i.) A rectifier is used for powering appliances
ii.) It is also used in AM radio , etc

7. **What is passive components?**

Answer:- Passive components are electrical components that do not require any form of electrical power to operate. Examples:- Resitor, capacitor, inductor, diodes, thermistor, transformer, etc.

8. **What is AC?**

Answer:- Alternating Current (AC) is a type of electrical current, in which the direction of the flow of electrons switches back and forth at regular intervals or cycles.

9. **What is DC?**

Answer:- Direct current (DC) is electrical current which flows consistently in one direction.

10. **What is the type of waveform in AC?**

Answer:- AC can be represented by many waveforms like a triangular wave, square wave but the most common representative is a sine wave.

11. Why half wave ractify only half cycle and full wave rectify full cycle?

Answer:- Because half wave rectifier only has 1 diode where as full wave rectifier have 2 diodes.

Experiment 2:- To Design and implement Schmitt Trigger (using Op-Amp)

1. What is Schmitt trigger?

Answer:- It is basically an inverting comparator circuit with a positive feedback.

2. What is the purpose of Schmitt trigger?

Answer:- The purpose of the Schmitt trigger is to convert any regular or irregular shaped input waveform into a square wave output voltage or pulse.

3. What is the name of component used in Schmitt trigger?

Answer:- op-amp (operational Amplifier)

4. What is Amplifier and op-amp?

Answer:- An amplifier is an integrated circuit that can amplify weak electric signals.

An operational amplifier is an amplifier which amplifies the mathematical operations.

5. Why operational word is used in op-amp?

Answer:- because they were used to model the basic mathematical operations of addition, subtraction, integration, differentiation, etc. in electronic analog computers.

6. What is the application of Schmitt trigger?

Answer:- Schmitt triggers are mainly used for changing a sine wave to square wave.

7. What is the significance of Square wave form?

Answer:- Square waves are used in all kinds of digital equipment because they are ideal for representing the ones and zeros of digital.

Experiment 3:- To Design and implement relaxation oscillator (using Op-Amp).

1. What is relaxation oscillator?

Answer:- A relaxation oscillator is basically a non-linear oscillator that has the ability to generate a non-sinusoidal periodic waveform at its output. Such as triangular wave, square wave etc.

2. What is non-sinusoidal waveform?

Answer:- Any waveform that differs from the basic description of the sinusoidal waveform is referred to as non-sinusoidal.

3. **Why relaxation oscillator is named so?**

Answer:- because the timing interval is set up by the charging of a capacitor and the timing interval is ceased by the rapid discharge of the same capacitor.

4. **What is capacitor?**

Answer:- A capacitor is a device that stores electrical energy in an electric field.

5. **What inside a capacitor?**

Answer:- A capacitor is created out of two metal plates and an insulating material called a dielectric.

Experiment 4:- To Design and implement CMOS Inverter.

1. **What is the full form of CMOS?**

Answer:- Complementary metal oxide semiconductor.

2. **What is the significance of complementary word in CMOS Full form?**

Answer:- It means complement that is for the input 0 it will give 1 as output and for input 1 it will give 0.

3. **What CMOS consist of?**

Answer:- CMOS consists of two MOSFET named as P-channel MOSFET and N-channel MOSFET.

4. **What are the name of terminals in PMOS and NMOS? Also name its function/definition.**

Answer:- The three terminals are Source, Drain and Gate.

- **Source:** It is a terminal through which charge carriers enter the channel.
- **Drain:** It is a terminal through which charge carriers leave the channel.
- **Gate:** This terminal controls the conductivity between source and drain terminals.

5. **What is MOSFET?**

Answer:- The MOSFET (Metal Oxide Semiconductor Field Effect Transistor) transistor is a semiconductor device that is widely used for switching purposes and for the amplification of electronic signals in electronic devices.

6. **What are the types of MOSFET?**

Answer:- 1. Depletion Mode MOSFET:- conducts at 0 volt.

2. Enhancement Mode MOSFET:- does not conducts at 0 volt.

7. **What is the difference between p-channel MOSFET and n-channel MOSFET?**

Answer:- in n channel MOSFET the current is carried by electrons while in p-channel MOSFET, it is carried by holes.

8. **Working of CMOS? Full explanation.**

Answer:- It consists of two MOSFETs in series in such a way that the P-channel device has its source connected to a positive voltage and the N-channel device has its source connected to ground. The gates of the two devices are connected together as the common input and the drains are connected together as the common output. **When input is HIGH,** the gate of P-channel is OFF. On the other hand, the gate of N-channel is ON. This will produce Vout = 0 .**When input is LOW,** the gate of P-channel is ON and N-channel is OFF. This produces output voltage = +VDD.

9. **For which condition CMOS is ON and for which it is OFF?**

Answer:- CMOS is ON when the input is LOW and it is OFF when the input is HIGH.

10. **How many terminals are there in MOSFET devices?**

Answer:- MOSFET is a three-terminal device with gate (G), drain (D) and source (S) terminals.

11. **What is the significance of Inverter in CMOS Inverter?**

Answer:- It is inverting the input it receive.

Experiment 5:- To Design and implement Transistor as a switch.

1. **What is transistor?**

Answer:- Transistor is a three terminal, bipolar, current controlled device.

2. **What is the significance of bipolar in this definition of transistor?**

Answer:- Bipolar means it uses both Electron and holes as carriers.

3. **Why transistor is called a current controlled device?**

Answer:- The output voltage, current or power is controlled by the input current in a transistor. So it is called the current controlled device.

4. **What is the name of 3 terminals of transitor?**

Answer:- Base, Collector and Emitter

5. **What are the various configuration of transistor?**

Answer:- following are the three configuration of transistor:-

i.) Common base configuration
ii.) Common emitter configuration
iii.) Common collector configuration

6. **Which configuration is used in this experiment? And Why Common Emitter configuration is most popular in amplifier circuits?**

Answer:- Common Emitter configuration is mainly used because its current, voltage and power gains are quite high and the ratio of output impedance and input impedance are quite moderate.

7. **Which transistor is we are using in this experiment?**

Answer:- npn transistor.

8. **Why npn transitor is preferred / used ?**

Answer:- The majority charge carriers in an NPN transistor are electrons and the majority carriers in a PNP transistor are holes. The electrons have better mobility than holes. Therefore, NPN transistors are preferred over PNP transistors.

9. **What is the major difference between npn and pnp ?**

Answer:- The majority charge carriers in an NPN transistor are electrons and the majority carriers in a PNP transistor are holes.

10. **What are the various types of transistor?**

Answer:- NPN and PNP transistors.

11. **What are the functions of Transistor?**

Answer:- Transistor has many functions, such as detecting, rectifying, amplifying, switching, voltage stabilizing, signal modulating and so on.

12. **Justify the statement: "Transistor as a switch".**

Answer:- When input is high, the transistor is turned on and works in saturation region. So maximum current IC flows through transistor as well as LED. Hence LED emits the light. When input is low the transistor remains in cutoff. So current IC is zero thus LED does not emit the light. Thus transistor is working as a switch which can be made on or off by an external input.

13. **Will the current flow when the input is low when the input is low? Why?**

Answer:- When input is low the transistor remains in cutoff region. So current IC is zero thus LED does not emit the light. So current isn't flowing.

14. **Property of P-N Juction?**

Answer:- A p-n junction diode is a basic semiconductor device that controls the flow of electric current in a circuit.

15. **Application of P-N junction?**

Answer:- P-N Junction is used in Solar cell. p-n junction diode can be used as a photodiode. When the diode is forward-biased, it can be used in LED .

16. **In which condition transistor will be ON and in which it will be OFF?**

Answer:- Transistor will be ON when the input is high and it will be OFF when the input is low.

17. What is the function of emitter, base and collector in transistor?

Answer:- The base is the gate controller device for the larger electrical supply. The collector is the larger electrical supply, and the emitter is the outlet for that supply. The emitter is a heavily doped layer, a base is moderately doped and the collector is lightly doped.

18. What is the different regions in which transistor operate?

Answer:- Active, Saturation and Cut-off region.

19. What you mean by input characteristics?

Answer:- The input characteristics describe the relationship between input current and the input voltage at constant Output voltage.

20. What you mean by Output characteristic?

Answer:- The output characteristics describe the relationship between output current and the output voltage, at constant Input current.

21. What is active region? Its application?

Answer:- The active region of the Transistor is the area on the Output curve where the Output Current is almost constant and independent of the Output Voltage. It is used for amplification.

22. What is Saturation region? Its application.

Answer:- The saturation region of the Transistor is the area where the collector Current rapidly increases with a little increase in Output Voltage. It is used as ON condition in switch.

23. What is Cut-off region?

Answer:- It is the region in which the base Current is effectively zero.

24. What is depletion region?

Answer:- Depletion region or depletion layer is a region in a P-N junction diode where no mobile charge carriers are present.

25. What is pentavalent impurities?

Answer:- Pentavalent impurities are the atoms with five valence electrons used for the doping of semiconductors. E.g. Arsenic (As), Phosphorous (Pi), Antimony (Sb), etc.

26. What is trivalent impurities?

Answer:- Trivalent impurities are the atoms with three valence electrons used for doping of semiconductors. E.g. Indium , Gallium, Aluminium, Boron ,etc.

27. What is the difference between Common Base and Common Emitter?

Answer:- Common Base Configuration – has Voltage Gain but no Current Gain.

Common Emitter Configuration – has both Current and Voltage Gain.

COMMON QUESTIONS WHICH CAN BE ASKED IN ANY OF EXPERIMENT 6-9

1. **What is Combinational circuit?**

Answer:- Those circuit in which output is dependent on present state of the inputs is called Combinational circuit.

2. **Why combinational circuit is called combinational?**

Answer:- Because in this the order of combination is irrelevant (that is the order of input does not matter).

3. **What is sequential circuits?**

Answer:- Those circuit in which output is dependent on present as well as past state of the inputs too is called sequential circuit. They are dependent on time.

4. **What is major difference between combinational and sequential circuits?**

Answer:- Combinational circuit depends on present state of inputs while the sequential circuits depends on past input too.

5. **What are the examples of combinational circuit?**

Answer:- Encoder,decoder, half adder, full adder, multiplexer, demultiplexer are some examples of combinational circuit.

6. **What are the examples of sequential circuits?**

Answer:- Flip flops, counters, Register memories are some examples of sequential circuits.

7. **Why module is used in the code you written?**

Answer:- because Verilog code starts with module and end with endmodule.

8. **Meaning of wire in code?**

Answer:- wire elements are used to connect input and output ports of a module instantiation together with some other element in your design

9. **What is flip flop?**

Answer:- A flip-flop is a device which stores a single bit (binary digit) of data

10. **What is major difference between Structural and dataflow model?**

Answer:- **Dataflow modelling uses Boolean equations** as design specifications. For eg. to design AND gate you use the equation y <= a & b ; Statements are executed concurrently. On the other hand, **Structural modelling uses logic diagrams. T**he concept is similar to functions. Here we create components of each logic gate which is used multiple times in the code

11. **Which is used as memory element in Sequential Circuit?**

Answer:- Flip Flop

Experiment 6:- To Design and implement Basic Logic Gates.

1. **What are the basic logic gates?**

Answer:- AND, OR and NOT GATES are basic logic gates.

2. **Why are they called as basic logic gates?**

Answer:- because we can make all other gates from these 3 gates.

3. **How you would make NAND gate from AND gate?**

Answer:- by connecting AND gate with NOT gate.

4. **What is truth table?**

Answer:- truth table is a mathematical table that lists the output of a particular digital logic circuit for all the possible combinations of its inputs.

5. **What is the truth table of AND gate?**

Answer:- for 1 and 1 output is 1 and for all other combination, output is 0.

6. **What is the truth table for OR gate?**

Answer:- for 0 and 0 output is 0 and for all other combination, output is 1.

7. **What is truth table for NOT gate?**

Answer:- for input 0, output is 1. And for input 1 output is 0.

8. **Which arithmetic operation is represented by AND GATE?**

Answer:- Multiplication

9. **Difference between AND , OR and NOT?**

Answer:- AND gate gives a 'true' output only when both inputs are 'true', whereas OR gate gives an output of 'true' if at least one of the inputs is 'true'. Whereas NOT is just giving the complement of input.

10. **Why AND GATE have 0-0 and not 0-0-0?**

Answer:- Because it totally depends on us. If we want to take three input then we can use 0-0-0 too.

11. **What is the value of 1+1 and 1+1+1?**

Answer:- 1+1 = 10 in which 0 is SUM and 1 is Carry. 1+1+1 = 11 in which 1 is SUM and 1 is Carry.

12. **Why LOGIC GATES is called "LOGIC" gate?**

Answer:- Because The relationship between the input and output is based on a certain logic

Experiment 7:- To Design and implement of Half Adder and Full adder.

1. **What is adder?**

Answer:- An adder is a digital circuit that performs addition of numbers.

2. **What is difference between adder and subtractor?**

Answer:- Binary Adder is used for ADDITION (SUM & COUT) whereas the binary subtractor produces a DIFFERENCE, D by using a BORROW bit, B from the previous column.

3. **What are the types of adder?**

Answer:- 1. Half adder 2. Full adder

4. **What is Half adder?**

Answer:- A half adder is an adder which adds two binary digits together, resulting in a sum and a carry.

5. **What is full adder?**

Answer:- Full Adder is the adder which adds three inputs(A,B,C-IN) and produces two outputs(SUM,C-OUT).

6. **What is the major difference between Half adder and full adder?**

Answer:- The major difference between Half Adder and Full Adder is that Half Adder adds two 1-bit numbers given as input but **do not add the carry** obtained from previous addition while the Full Adder, along with two 1-bit numbers can **also add the carry** obtained from previous addition.

7. **What is the name of gates used in Half adder?**

Answer:- 1 XOR GATE and 1 AND GATE

8. **Why we are using AND gate in half adder?**

Answer:- because in carry we have output as multiplication of 2 input values and AND gate is the only gate which is giving us multiplication.

9. **How we are getting SUM and Carry in half adder?**

Answer:- XOR GATE for SUM AND GATE for CARRY

10. **Which GATES we are using to get SUM and carry in full adder?**

Answer:- CARRY-OUT = A AND B OR Cin(A XOR B) SUM = (A XOR B) XOR Cin

CARRY-OUT -> 2 AND, 1 XOR , 1 OR SUM -> 2 XOR

Experiment 8:- To Design and implement Multiplexer and De-Multiplexer.

1. **What is Multiplexer?**

Answer:- Multiplexer is a data selector which takes several inputs and gives a single output.In multiplexer we have 2n input lines and 1 output lines where n is the number of selection lines.

2. **What is De-Multiplexer?**

Answer:- Demultiplexer is a data distributor which takes a single input and gives several outputs.In demultiplexer we have 1 input and 2n output lines where n is the selection line.

3. **What is the difference between multiplexer and demultiplexer?**

Answer:- Multiplexer processes the digital information from various sources into a single source whereas Demultiplexer receives digital information from a single source and converts it into several sources

4. **What is the function of multiplexer and demultiplexer?**

Answer:- The basic function of a multiplexer: combining multiple inputs into a single data stream. The basic function of demultiplexer: distributing single input into multiple data stream.

5. **What is the application of multiplexer and demultiplexer?**

Answer:- Multiplexer and demultiplexer both are used for transmitting different type of data such as audio, video at the same time using a single transmission line.

Experiment 9:- To Design and implement Encoder and Decoder.

1. **What is Encoder?**

Answer:- An Encoder is a device that converts the active data signal into a coded message format or it is a device that converts analogue signal to digital signals.

2. **What is Decoder?**

Answer:- It is just opposite of Encoder. A decoder is a device that generates the original signal as output from the coded input signal.

3. **What is basic difference between encoder and decoder?**

Answer:- Encoder circuit basically converts the applied information signal into a coded digital bit stream. Whereas ecoder performs reverse operation and recovers the original information signal from the coded bits.

4. **What are the application of Encoder/ decoder?**

Answer:- Encoder is used in E-mail, video encoders etc. Decoder is used in Microprocessors, memory chips etc.

5. **Why we are using 0 and 1 in encoder/decoder and not using 2,3,..9?**

Answer:- Because it accept binary values and 0 and 1 are the only binary numbers.

6. **Can we use encoder for long path transmission?**

Answer:- YES