

# PHY301

## Circuit Theory

### Important mcqs

#### Lec 23 - Thevenin's Theorem and examples

##### What is Thevenin's theorem?

- a. A theorem that simplifies complex circuits to a single voltage source and series resistance.
- b. A theorem that simplifies complex circuits to a single current source and parallel resistance.
- c. A theorem that calculates the current flowing in a circuit.

**Solution: a**

##### Who developed Thevenin's theorem?

- a. James Clerk Maxwell
- b. Charles Wheatstone
- c. Leon Charles Thevenin

**Solution: c**

##### What is the Thevenin resistance?

- a. The equivalent resistance of a circuit when all voltage sources are turned off and all current sources are shorted.
- b. The voltage between two points in a circuit when no current is flowing through the circuit.
- c. The equivalent resistance of a circuit when all voltage sources are turned on and all current sources are open.

**Solution: a**

##### How can we determine the Thevenin voltage of a circuit?

- a. By selecting two points in the circuit and assuming that all components to the right of these points are removed, leaving only the components to the left.

b. By selecting two points in the circuit and assuming that all components to the left of these points are removed, leaving only the components to the right.

c. By measuring the voltage at a single point in the circuit.

**Solution: a**

**How can we determine the Thevenin resistance of a circuit?**

a. By selecting two points in the circuit and assuming that all components to the right of these points are removed, leaving only the components to the left.

b. By selecting two points in the circuit and assuming that all components to the left of these points are removed, leaving only the components to the right.

c. By measuring the resistance of a single component in the circuit.

**Solution: a**

**Can Thevenin's theorem be used for AC circuits?**

a. Yes

b. No

**Solution: a**

**Can Thevenin's theorem be used for DC circuits?**

a. Yes

b. No

**Solution: a**

**What is the equivalent resistance of a circuit with only resistors in series?**

a. The sum of all the resistances.

b. The reciprocal of the sum of the reciprocals of all the resistances.

c. The difference between the highest and lowest resistance.

**Solution: a**

**What is the equivalent resistance of a circuit with only resistors in parallel?**

- a. The sum of all the resistances.
- b. The reciprocal of the sum of the reciprocals of all the resistances.
- c. The difference between the highest and lowest resistance.

**Solution: b**

**What is the advantage of using Thevenin's theorem?**

- a. It allows us to simplify complex circuits into simpler circuits, making it easier to analyze and understand them.
- b. It allows us to increase the voltage in a circuit.
- c. It allows us to decrease the resistance in a circuit.

**Solution: a**

## Lec 24 - Examples of Thevenin's Theorem

What is the equivalent resistance for the circuit shown below when looking from terminals A and B using Thevenin's theorem?

5? 10?



A --------- B

- a. 3.33?
- b. 7.5?
- c. 15?
- d. 50?

**Answer: b. 7.5?.** The equivalent resistance is the sum of the two resistors:  $5? + 10? = 15?$ . Then, the Thevenin resistance is the same as the equivalent resistance: 7.5?.

What is the Thevenin voltage for the circuit shown below when looking from terminals A and B using Thevenin's theorem?

20V

A --------- B



10? 5?

- a. 10V
- b. 15V
- c. 20V
- d. 25V

**Answer: c. 20V.** To find the Thevenin voltage, we need to calculate the voltage across the terminals A and B when the circuit is open. This is the same as the voltage across the 5? resistor, which is given as 20V.

What is the equivalent circuit for the circuit shown below when looking from terminals A and B using Thevenin's theorem?

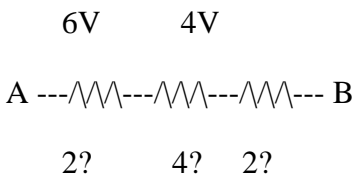
5? 10?

A --------- B

- a. 7.5V voltage source in series with a 7.5 $\Omega$  resistor
- b. 10V voltage source in series with a 15 $\Omega$  resistor
- c. 20V voltage source in series with a 10 $\Omega$  resistor
- d. 15V voltage source in series with a 5 $\Omega$  resistor

**Answer: a. 7.5V voltage source in series with a 7.5 $\Omega$  resistor. We found in question 1 that the equivalent resistance is 7.5 $\Omega$ , and in question 2 that the Thevenin voltage is 20V. Therefore, the equivalent circuit is a 7.5V voltage source in series with a 7.5 $\Omega$  resistor.**

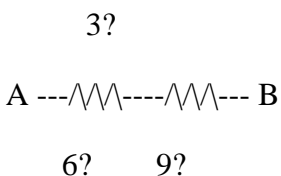
**What is the Thevenin voltage for the circuit shown below when looking from terminals A and B using Thevenin's theorem?**



- a. 4V
- b. 6V
- c. 8V
- d. 10V

**Answer: b. 6V. To find the Thevenin voltage, we need to calculate the voltage across the terminals A and B when the circuit is open. This is the same as the voltage across the 4 $\Omega$  and 2 $\Omega$  resistors in series, which is given as 6V.**

**What is the Thevenin resistance for the circuit shown below when looking from terminals A and B using Thevenin's theorem?**



- a. 6 $\Omega$
- b. 8 $\Omega$
- c. 9 $\Omega$
- d. 12 $\Omega$

**Answer: a. 6?. The equivalent resistance is the sum of the two resistors in parallel**

## **Lec 25 - Norton's Theorem with examples**

**What does Norton's theorem state about a linear circuit?**

- A. It can be replaced with a single voltage source and a series resistor.
- B. It can be replaced with a single current source and a parallel resistor.
- C. It can be replaced with a single capacitor and an inductor.
- D. None of the above.

**Answer: B**

**What is the equivalent resistance in a Norton equivalent circuit?**

- A. The resistance across the two terminals of the circuit.
- B. The resistance across the two parallel components in the circuit.
- C. The resistance across the two series components in the circuit.
- D. None of the above.

**Answer: A**

**Can Norton's theorem be applied to nonlinear circuits?**

- A. Yes
- B. No**

**Answer: B**

**What is the significance of the Norton current in a circuit?**

- A. It is equal to the open circuit voltage of the circuit.
- B. It is equal to the short circuit current of the circuit.
- C. It is equal to the equivalent resistance of the circuit.
- D. None of the above.

**Answer: B**

**How is the Norton equivalent circuit different from the original circuit?**

- A. The Norton equivalent circuit has a single voltage source and a series resistor.
- B. The Norton equivalent circuit has a single current source and a parallel resistor.
- C. The Norton equivalent circuit has the same number of components as the original circuit.
- D. None of the above.

**Answer: B**

**What is the purpose of using Norton's theorem in circuit analysis?**

- A. To make the circuit more complicated.
- B. To make the circuit easier to analyze.
- C. To increase the voltage across the circuit.
- D. None of the above.

**Answer: B**

**What is the Norton resistance in a circuit?**

- A. It is equal to the resistance between the two terminals of the circuit when all the independent sources are turned off.
- B. It is equal to the resistance between the two parallel components in the circuit.
- C. It is equal to the resistance between the two series components in the circuit.
- D. None of the above.

**Answer: A**

**How is the Norton equivalent circuit useful in circuit design?**

- A. It can be used to calculate the equivalent resistance of the circuit.
- B. It can be used to calculate the voltage across any load resistance connected between the two terminals of the circuit.
- C. It can be used to calculate the current across any load resistance connected between the two terminals of the circuit.
- D. None of the above.

**Answer: B**



**How is the Norton current determined in a circuit?**

- A. It is equal to the voltage across the circuit.
- B. It is equal to the resistance of the circuit.
- C. It is equal to the short circuit current that would flow through the original circuit when the load resistance is set to zero.
- D. None of the above.

**Answer: C**

**What is the difference between Norton's current and load current in a circuit?**

- A. Norton's current is the current that flows through the circuit when the load resistance is nonzero, while the load current is the current that would flow through the circuit when the load resistance is set to zero.
- B. Norton's current is the current that would flow through the circuit when the load resistance is set to zero, while the load current is the current that flows through the circuit when the load resistance is nonzero.
- C. Norton's current is the same as the load current.
- D. None of the above.

**Answer: B**

## **Lec 26 - Norton's Theorem with examples Part 2**

**What does Norton's theorem state about a linear circuit?**

- A. It can be replaced with a single voltage source and a series resistor.
- B. It can be replaced with a single current source and a parallel resistor.
- C. It can be replaced with a single capacitor and an inductor.
- D. None of the above.

**Answer: B**

**What is the equivalent resistance in a Norton equivalent circuit?**

- A. The resistance across the two terminals of the circuit.
- B. The resistance across the two parallel components in the circuit.
- C. The resistance across the two series components in the circuit.
- D. None of the above.

**Answer: A**

**Can Norton's theorem be applied to nonlinear circuits?**

- A. Yes
- B. No

**Answer: B**

**What is the significance of the Norton current in a circuit?**

- A. It is equal to the open circuit voltage of the circuit.
- B. It is equal to the short circuit current of the circuit.
- C. It is equal to the equivalent resistance of the circuit.
- D. None of the above.

**Answer: B**

**How is the Norton equivalent circuit different from the original circuit?**

- A. The Norton equivalent circuit has a single voltage source and a series resistor.
- B. The Norton equivalent circuit has a single current source and a parallel resistor.
- C. The Norton equivalent circuit has the same number of components as the original circuit.
- D. None of the above.

**Answer: B**

**What is the purpose of using Norton's theorem in circuit analysis?**

- A. To make the circuit more complicated.
- B. To make the circuit easier to analyze.
- C. To increase the voltage across the circuit.
- D. None of the above.

**Answer: B**

**What is the Norton resistance in a circuit?**

- A. It is equal to the resistance between the two terminals of the circuit when all the independent sources are turned off.
- B. It is equal to the resistance between the two parallel components in the circuit.
- C. It is equal to the resistance between the two series components in the circuit.
- D. None of the above.

**Answer: A**

**How is the Norton equivalent circuit useful in circuit design?**

- A. It can be used to calculate the equivalent resistance of the circuit.
- B. It can be used to calculate the voltage across any load resistance connected between the two terminals of the circuit.
- C. It can be used to calculate the current across any load resistance connected between the two terminals of the circuit.
- D. None of the above.

**Answer: B**

**How is the Norton current determined in a circuit?**

- A. It is equal to the voltage across the circuit.
- B. It is equal to the resistance of the circuit.
- C. It is equal to the short circuit current that would flow through the original circuit when the load resistance is set to zero.
- D. None of the above.

**Answer: C**

**What is the difference between Norton's current and load current in a circuit?**

- A. Norton's current is the current that flows through the circuit when the load resistance is nonzero, while the load current is the current that would flow through the circuit when the load resistance is set to zero.
- B. Norton's current is the current that would flow through the circuit when the load resistance is set to zero, while the load current is the current that flows through the circuit when the load resistance is nonzero.
- C. Norton's current is the same as the load current.
- D. None of the above.

**Answer: B**

## Lec 27 - Intrinsic Silicon

What is intrinsic silicon?

- a. A type of metal
- b. A type of semiconductor material made from pure silicon atoms
- c. A type of insulator
- d. A type of superconductor

Answer: b

What is the bandgap of intrinsic silicon?

- a. 0.5 eV
- b. 1.12 eV
- c. 1.5 eV
- d. 2.0 eV

Answer: b

How does intrinsic silicon conduct electricity?

- a. Through the movement of free electrons only
- b. Through the movement of holes only
- c. Through the movement of both free electrons and holes
- d. Intrinsic silicon does not conduct electricity

Answer: c

What is the photoelectric effect?

- a. The movement of free electrons and holes in a semiconductor material
- b. The generation of a flow of electricity when light strikes the surface of a material
- c. The ability of a material to resist the flow of electricity
- d. The transfer of heat between two objects

Answer: b

How is intrinsic silicon different from doped silicon?

- a. Intrinsic silicon is a metal, while doped silicon is a semiconductor
- b. Intrinsic silicon has impurities added to it, while doped silicon is pure
- c. Intrinsic silicon is a semiconductor made from pure silicon atoms, while doped silicon has impurities added to alter its electronic properties
- d. Intrinsic silicon and doped silicon have the same electronic properties

Answer: c

What is the crystal structure of intrinsic silicon?

- a. Amorphous
- b. Polycrystalline
- c. Crystalline
- d. Liquid

Answer: c

What is the role of electrons in the electronic properties of intrinsic silicon?

- a. Electrons are not involved in the electronic properties of intrinsic silicon
- b. Electrons are responsible for the ability of intrinsic silicon to conduct electricity
- c. Electrons are responsible for the color of intrinsic silicon
- d. Electrons are responsible for the strength of intrinsic silicon

Answer: b

What are some electronic devices that use intrinsic silicon?

- a. Transistors, diodes, and solar cells
- b. Batteries, resistors, and capacitors
- c. Microphones, speakers, and headphones
- d. Antennas, filters, and amplifiers

Answer: a

What is p-type silicon?

- a. Silicon with an excess of free electrons
- b. Silicon with a surplus of holes
- c. Silicon with both an excess of free electrons and a surplus of holes
- d. Silicon without any impurities

Answer: b

Why is intrinsic silicon an ideal semiconductor material?

- a. Because it has a large bandgap
- b. Because it is a good insulator
- c. Because it is a good conductor of electricity
- d. Because of its unique electronic properties, including its small bandgap and ability to conduct electricity through the movement of free electrons and holes

Answer: d

## Lec 28 - PN Junction Diode

Which of the following materials is commonly used to create the p-type region of a PN junction diode?

- A. Arsenic
- B. Boron
- C. Phosphorus
- D. Silicon

**Answer: B. Boron**

What happens to the majority carriers in the depletion region of a PN junction diode?

- A. They are attracted to each other
- B. They are repelled from each other
- C. They remain stationary
- D. They move randomly

**Answer: B. They are repelled from each other**

What is the typical forward voltage drop of a silicon PN junction diode?

- A. 0.1 volts
- B. 0.3 volts
- C. 0.5 volts
- D. 0.7 volts

**Answer: D. 0.7 volts**

What is the reverse breakdown voltage of a PN junction diode?

- A. The voltage at which the diode conducts in the reverse direction
- B. The maximum voltage that can be applied in the forward direction
- C. The maximum voltage that can be applied in the reverse direction without damaging the diode
- D. The voltage at which the diode breaks down and conducts in the reverse direction

**Answer: D. The voltage at which the diode breaks down and conducts in the reverse direction**



**Which of the following applications uses a PN junction diode as a voltage regulator?**

- A. Power amplifier
- B. Voltage multiplier
- C. Oscillator
- D. Rectifier

**Answer: B. Voltage regulator**

**Which of the following types of diodes emits light when forward biased?**

- A. Zener diode
- B. Schottky diode
- C. Varactor diode
- D. Light-emitting diode

**Answer: D. Light-emitting diode**

**What is the function of a rectifier circuit using a PN junction diode?**

- A. To convert AC voltage to DC voltage
- B. To amplify a signal
- C. To filter out unwanted frequencies
- D. To regulate voltage

**Answer: A. To convert AC voltage to DC voltage**

**What happens to the current through a PN junction diode when it is reverse biased?**

- A. It decreases exponentially with increasing reverse voltage
- B. It increases linearly with increasing reverse voltage
- C. It remains constant
- D. It increases exponentially with increasing reverse voltage

**Answer: A. It decreases exponentially with increasing reverse voltage**

**Which of the following is a characteristic of a PN junction diode in reverse bias?**

- A. High resistance
- B. Low resistance
- C. No resistance
- D. Infinite resistance

**Answer: A. High resistance**

**Which of the following is a characteristic of a PN junction diode in forward bias?**

- A. High resistance
- B. Low resistance
- C. No resistance
- D. Infinite resistance

**Answer: B. Low resistance**

## **Lec 29 - Terminal characteristics of the Junction diodes**

**What is the typical forward voltage drop for a silicon PN junction diode?**

- A. 0.3V
- B. 0.5V
- C. 0.7V
- D. 1.0V

**Answer: C. 0.7V**

**What is the depletion region of a PN junction?**

- A. The region where the mobile charge carriers are depleted
- B. The region where the mobile charge carriers are accumulated
- C. The region where the doping concentration is highest
- D. The region where the doping concentration is lowest

**Answer: A. The region where the mobile charge carriers are depleted**

**What is reverse saturation current?**

- A. The current that flows in the forward direction when the diode is forward-biased
- B. The current that flows in the reverse direction when the diode is forward-biased
- C. The current that flows in the forward direction when the diode is reverse-biased
- D. The current that flows in the reverse direction when the diode is reverse-biased

**Answer: D. The current that flows in the reverse direction when the diode is reverse-biased**

**What is the breakdown voltage of a PN junction diode?**

- A. The voltage at which the diode turns on
- B. The voltage at which the diode turns off
- C. The voltage at which the diode starts to conduct heavily in the forward direction
- D. The voltage at which the diode breaks down and allows a large current to flow in the reverse direction

**Answer: D. The voltage at which the diode breaks down and allows a large current to flow in the reverse direction**

**What is the diode equation?**

- A. An empirical relationship between the current flowing through a PN junction diode and the voltage across it
- B. A mathematical relationship between the resistance of a diode and its temperature coefficient
- C. A relationship between the doping concentration of a diode and its breakdown voltage
- D. A relationship between the size of a diode and its maximum power dissipation

**Answer: A. An empirical relationship between the current flowing through a PN junction diode and the voltage across it**

**What is the typical reverse leakage current of a silicon PN junction diode?**

- A. Microamperes
- B. Milliamperes
- C. Amperes
- D. The reverse leakage current of a diode is always zero

**Answer: A. Microamperes**

**What is the ideality factor of a PN junction diode?**

- A. A measure of how closely the behavior of a diode follows the ideal diode equation
- B. A measure of the temperature coefficient of a diode
- C. A measure of the doping concentration of a diode
- D. A measure of the physical size of a diode

**Answer: A. A measure of how closely the behavior of a diode follows the ideal diode equation**

**What happens to the forward current through a diode as the forward voltage is increased?**

- A. It remains constant
- B. It decreases
- C. It increases exponentially
- D. It increases linearly

**Answer: C. It increases exponentially**

**What happens to the reverse current through a diode as the reverse voltage is increased?**

- A. It remains constant
- B. It decreases
- C. It increases exponentially
- D. It increases linearly

**Answer: C. It increases exponentially**

**What is the typical reverse breakdown voltage for a silicon PN junction diode?**

- A. 5V
- B. 10V
- C. 50V
- D. 100V**

**Answer: C. 50V**

## Lec 30 - Analysis of diode circuits

**What is the purpose of a diode in a circuit?**

- A. To increase voltage
- B. To decrease voltage
- C. To regulate current
- D. To increase resistance

**Answer: C. To regulate current**

**Which direction does current flow in a forward-biased diode?**

- A. From cathode to anode
- B. From anode to cathode
- C. In both directions
- D. None of the above

**Answer: A. From cathode to anode**

**Which of the following is the equation for the current-voltage relationship in a diode?**

- A.  $V = IR$
- B.  $I = V/R$
- C.  $I = I_s(e^{(V/V_T)} - 1)$
- D.  $V = I \cdot R$

**Answer: C.  $I = I_s(e^{(V/V_T)} - 1)$**

**What is the voltage drop across a silicon diode when it is forward-biased?**

- A. 0.3V
- B. 0.6V
- C. 1.2V
- D. 2.4V

**Answer: B. 0.6V**

**What is the purpose of a load resistor in a diode circuit?**

- A. To limit the current
- B. To increase the voltage
- C. To decrease the voltage
- D. To increase the resistance

**Answer: A. To limit the current**

**In a half-wave rectifier circuit, what is the output waveform?**

- A. Sine wave
- B. Square wave
- C. Triangle wave
- D. Half sine wave

**Answer: D. Half sine wave**

**What is the purpose of a smoothing capacitor in a rectifier circuit?**

- A. To increase voltage
- B. To decrease voltage
- C. To regulate current
- D. To smooth out the ripple

**Answer: D. To smooth out the ripple**

**In a full-wave rectifier circuit, what is the output waveform?**

- A. Sine wave
- B. Square wave
- C. Triangle wave
- D. Full sine wave

**Answer: D. Full sine wave**

**What is the purpose of a zener diode in a circuit?**

- A. To regulate current
- B. To protect against voltage spikes
- C. To increase voltage
- D. To decrease voltage

**Answer: B. To protect against voltage spikes**

**What is the voltage across a zener diode when it is in breakdown?**

- A. 0V
- B. 1V
- C. 5V
- D. Variable depending on the diode

**Answer: D. Variable depending on the diode.**



## Lec 31 - Terminal characteristics of the Junction diodes

**What is the forward voltage drop of a silicon junction diode?**

- A. 0.2 volts
- B. 0.5 volts
- C. 0.7 volts
- D. 1.0 volts

**Answer: C. 0.7 volts**

**In which configuration of a junction diode, the positive terminal of a voltage source is connected to the p-type semiconductor and the negative terminal to the n-type semiconductor?**

- A. Reverse bias
- B. Forward bias
- C. Both A and B
- D. None of the above

**Answer: B. Forward bias**

**What is the reverse breakdown voltage of a junction diode?**

- A. The voltage at which the diode experiences a sudden increase in current flow in the forward bias configuration.
- B. The voltage at which the diode experiences a sudden decrease in current flow in the reverse bias configuration.
- C. The voltage at which the diode experiences a sudden increase in current flow in the reverse bias configuration.
- D. The voltage at which the diode experiences a sudden decrease in current flow in the forward bias configuration.

**Answer: C. The voltage at which the diode experiences a sudden increase in current flow in the reverse bias configuration.**

**What is the capacitance of a junction diode?**

- A. The property of the p-n junction to behave like a capacitor.
- B. The property of the p-n junction to behave like an inductor.

- C. The property of the p-n junction to behave like a resistor.
- D. None of the above.

**Answer: A. The property of the p-n junction to behave like a capacitor.**

**What is the temperature dependence of the forward voltage drop of a junction diode?**

- A. The forward voltage drop of a junction diode increases as the temperature increases.
- B. The forward voltage drop of a junction diode decreases as the temperature increases.
- C. The forward voltage drop of a junction diode remains constant with temperature.
- D. None of the above.

**Answer: B. The forward voltage drop of a junction diode decreases as the temperature increases.**

**What is the temperature dependence of the reverse breakdown voltage of a junction diode?**

- A. The reverse breakdown voltage of a junction diode increases as the temperature increases.
- B. The reverse breakdown voltage of a junction diode decreases as the temperature increases.
- C. The reverse breakdown voltage of a junction diode remains constant with temperature.
- D. None of the above.

**Answer: A. The reverse breakdown voltage of a junction diode increases as the temperature increases.**

**What is the Zener effect in a junction diode?**

- A. The mechanism of the forward breakdown of a junction diode.
- B. The mechanism of the reverse breakdown of a junction diode due to the collision of free electrons with atoms in the depletion region.
- C. The mechanism of the reverse breakdown of a junction diode due to the generation of minority carriers at a high electric field in the depletion region.
- D. None of the above.

**Answer: C. The mechanism of the reverse breakdown of a junction diode due to the generation of minority carriers at a high electric field in the depletion region.**

**What is the avalanche effect in a junction diode?**

- A. The mechanism of the forward breakdown of a junction diode.

- B. The mechanism of the reverse breakdown of a junction diode due to the collision of free electrons with atoms in the depletion region.
- C. The mechanism of the reverse breakdown of a junction diode due to the generation of minority carriers at a high electric field in the depletion region.
- D. None of the above.

**Answer: B. The mechanism of the reverse breakdown of a junction diode due to the collision of free electrons with atoms in the depletion region.**

## Lec 32 - DC or Static Resistance

What is the unit of resistance?

- A. Volt
- B. Ohm
- C. Ampere
- D. Watt

**Answer: B**

What is DC resistance?

- A. Resistance in AC circuits
- B. Resistance in DC circuits
- C. Resistance in both AC and DC circuits
- D. None of the above

**Answer: B**

What is the formula for calculating resistance using Ohm's Law?

- A.  $R = V \times I$
- B.  $R = V / I$
- C.  $R = I / V$
- D.  $V = R \times I$

**Answer: B**

What is a resistor?

- A. A component that amplifies the signal
- B. A component that stores energy
- C. A component that resists current flow
- D. A component that changes the frequency of the signal

**Answer: C**

**What is the color code on a resistor?**

- A. A system of dots that indicate the resistance value
- B. A system of letters that indicate the resistance value
- C. A system of numbers that indicate the resistance value
- D. A system of bands that indicate the resistance value

**Answer: D**

**What is the symbol for resistance?**

- A. V
- B. I
- C. R
- D. P

**Answer: C**

**How does increasing resistance affect current flow in a circuit?**

- A. Increases current flow
- B. Decreases current flow
- C. Does not affect current flow
- D. None of the above

**Answer: B**

**What is the difference between DC and AC resistance?**

- A. DC resistance refers to the resistance in AC circuits, while AC resistance refers to the resistance in DC circuits
- B. DC resistance refers to the resistance in DC circuits, while AC resistance refers to the resistance in AC circuits
- C. DC resistance refers to the resistance in both AC and DC circuits, while AC resistance refers to the resistance in AC circuits only
- D. DC resistance refers to the resistance in both AC and DC circuits, while AC resistance refers to the resistance in DC circuits only

**Answer: B**

**What is the unit of measurement for resistance?**

- A. Volt
- B. Ohm
- C. Ampere
- D. Watt

**Answer: B**

**What is Ohm's Law?**

- A. A law that describes the relationship between voltage and current in a circuit
- B. A law that describes the relationship between resistance and current in a circuit
- C. A law that describes the relationship between voltage and resistance in a circuit
- D. A law that describes the relationship between power and current in a circuit

**Answer: C**

## **Lec 33 - Small Signal Model and its applications**

**Which property of a system is essential for the small signal model?**

- A) Nonlinearity
- B) Instability
- C) Linearity
- D) Oscillation

**Answer: C) Linearity**

**What is the small signal model based on?**

- A) The principle of nonlinearity
- B) The principle of instability
- C) The principle of superposition
- D) The principle of oscillation

**Answer: C) The principle of superposition**

**Which components are typically included in a small signal model?**

- A) Transistors and amplifiers
- B) Resistors, capacitors, and inductors
- C) Transformers and power supplies
- D) Microcontrollers and digital logic gates

**Answer: B) Resistors, capacitors, and inductors**

**What is the purpose of amplifier design?**

- A) To remove unwanted signals from a signal
- B) To generate periodic signals
- C) To increase the amplitude of small signals
- D) To convert AC signals to DC signals

**Answer: C) To increase the amplitude of small signals**

**What is the purpose of filter design?**

- A) To remove unwanted signals from a signal
- B) To generate periodic signals
- C) To increase the amplitude of small signals
- D) To convert AC signals to DC signals

**Answer: A) To remove unwanted signals from a signal**

**What is the purpose of oscillator design?**

- A) To remove unwanted signals from a signal
- B) To generate periodic signals
- C) To increase the amplitude of small signals
- D) To convert AC signals to DC signals

**Answer: B) To generate periodic signals**

**Which technique is used to control the behavior of a circuit?**

- A) Amplification
- B) Feedback
- C) Filtering
- D) Oscillation

**Answer: B) Feedback**

**How does the small signal model help in circuit analysis?**

- A) It provides a simplified way to analyze the behavior of electronic devices.
- B) It helps in generating periodic signals.
- C) It removes unwanted signals from a signal.
- D) It converts AC signals to DC signals.

**Answer: A) It provides a simplified way to analyze the behavior of electronic devices.**



**Which property of a circuit is analyzed using the small signal model?**

- A) Nonlinear behavior
- B) Large signal behavior
- C) Small signal behavior
- D) Steady-state behavior

**Answer: C) Small signal behavior**

**What are the advantages of using the small signal model?**

- A) Simplified analysis of complex circuits
- B) Greater accuracy in predicting circuit behavior
- C) Efficient circuit design and optimization
- D) All of the above

**Answer: D) All of the above**

## **Lec 34 - Transformers**

**What is the primary function of a transformer?**

- A. To convert DC to AC
- B. To amplify electrical signals
- C. To transfer electrical energy through electromagnetic induction
- D. To protect electrical devices from power surges

**Answer: C**

**What is the turns ratio of a transformer?**

- A. The ratio of power output to power input
- B. The ratio of the number of turns in the secondary winding to the number of turns in the primary winding
- C. The ratio of voltage to current
- D. The ratio of resistance to capacitance

**Answer: B**

**What is the efficiency of a transformer?**

- A. The ratio of the number of turns in the primary winding to the number of turns in the secondary winding
- B. The ratio of the power output to the power input
- C. The ratio of the voltage output to the voltage input
- D. The ratio of the current output to the current input

**Answer: B**

**How are transformers used in power systems?**

- A. To convert DC to AC
- B. To amplify electrical signals
- C. To transfer electrical energy at high voltages and low currents
- D. To regulate the flow of current through a circuit

**Answer: C**

**What is the maximum power rating of a transformer?**

- A. The maximum amount of power that can be input into a transformer
- B. The maximum amount of power that can be output from a transformer
- C. The maximum amount of power that a transformer can handle before becoming damaged
- D. The maximum amount of power that a transformer can transfer through electromagnetic induction

**Answer: C**

**What is the frequency response of a transformer?**

- A. The ability of a transformer to transmit signals of different frequencies
- B. The maximum frequency that a transformer can handle
- C. The minimum frequency that a transformer can handle
- D. The frequency at which a transformer resonates

**Answer: A**

**What are step-up transformers used for?**

- A. To increase the voltage level of an electrical signal
- B. To decrease the voltage level of an electrical signal
- C. To amplify electrical signals
- D. To regulate the flow of current through a circuit

**Answer: A**

**What are isolation transformers used for?**

- A. To match the impedance of audio devices
- B. To protect electrical devices from power surges
- C. To transfer electrical energy between circuits
- D. To provide electrical isolation between two circuits

**Answer: D**

**What is the purpose of a transformer core?**

- A. To conduct electricity
- B. To provide mechanical support to the transformer
- C. To focus the magnetic field and increase the efficiency of the transformer
- D. To regulate the flow of current through a circuit

**Answer: C**

**What is a tap changer in a transformer?**

- A. A device used to change the frequency of the electrical signal
- B. A device used to adjust the voltage level of the electrical signal
- C. A device used to switch the transformer on and off
- D. A device used to match the impedance of audio devices

**Answer: B**

## **Lec 35 - Load voltage and current**

**What is load voltage?**

- A. The voltage across a load
- B. The voltage supplied to a load
- C. The voltage dropped across a resistor
- D. The voltage across a capacitor

**Answer: A. The voltage across a load**

**What is load current?**

- A. The current flowing through a load
- B. The current supplied to a load
- C. The current flowing through a resistor
- D. The current flowing through a capacitor

**Answer: A. The current flowing through a load**

**What is the relationship between voltage, current, and resistance?**

- A.  $V = IR$
- B.  $I = RV$
- C.  $R = VI$
- D.  $V = I/R$

**Answer: A.  $V = IR$**

**What is the power consumed by a load with a voltage of 10V and a current of 2A?**

- A. 5W
- B. 10W
- C. 15W
- D. 20W

**Answer: D. 20W ( $P = VI = 10V \times 2A = 20W$ )**

**What is a resistive load?**

- A. A load that stores and releases electrical energy
- B. A load that produces heat or light
- C. A load that is easy to pass current through
- D. A load that is difficult to pass current through

**Answer: B. A load that produces heat or light**

**What is a reactive load?**

- A. A load that produces heat or light
- B. A load that is easy to pass current through
- C. A load that stores and releases electrical energy
- D. A load that is difficult to pass current through

**Answer: C. A load that stores and releases electrical energy**

**For a capacitive load, what is the phase difference between load voltage and current?**

- A. 0 degrees
- B. 45 degrees
- C. 90 degrees
- D. 180 degrees

**Answer: C. 90 degrees**

**For an inductive load, what is the phase difference between load voltage and current?**

- A. 0 degrees
- B. 45 degrees
- C. 90 degrees
- D. 180 degrees

**Answer: C. 90 degrees**

**What is a multimeter used for?**

- A. Measuring voltage, current, and resistance
- B. Measuring only voltage
- C. Measuring only current
- D. Measuring only resistance

**Answer: A. Measuring voltage, current, and resistance**

**What is an oscilloscope used for?**

- A. Displaying the voltage waveform over time
- B. Measuring only voltage
- C. Measuring only current
- D. Measuring only resistance

**Answer: A. Displaying the voltage waveform over time**

## **Lec 36 - Full wave rectifier**

**Which of the following is the configuration of a full wave rectifier?**

- a) Center-tap
- b) Bridge
- c) Half-wave
- d) None of the above

**Answer: b) Bridge**

**How many diodes are used in a full wave rectifier?**

- a) 1
- b) 2
- c) 3
- d) 4

**Answer: d) 4**

**What is the purpose of the filter capacitor in a full wave rectifier circuit?**

- a) To increase the ripple in the output
- b) To reduce the ripple in the output
- c) To decrease the output voltage
- d) None of the above

**Answer: b) To reduce the ripple in the output**

**What is the ripple frequency in a full wave rectifier?**

- a) Half the frequency of the AC input
- b) Equal to the frequency of the AC input
- c) Double the frequency of the AC input
- d) None of the above

**Answer: c) Double the frequency of the AC input**



**What is the efficiency of a full wave rectifier compared to that of a half wave rectifier?**

- a) Higher
- b) Lower
- c) Same
- d) Cannot be determined

**Answer: a) Higher**

**What is the output voltage of a full wave rectifier compared to that of a half wave rectifier?**

- a) Higher
- b) Lower
- c) Same
- d) Cannot be determined

**Answer: a) Higher**

**What is the purpose of the center-tapped transformer in a full wave rectifier circuit?**

- a) To provide DC voltage
- b) To reduce the ripple in the output
- c) To double the output voltage
- d) None of the above

**Answer: d) None of the above**

**What is the peak inverse voltage rating required for the diodes in a full wave rectifier circuit?**

- a) Equal to the peak voltage of the AC input
- b) Twice the peak voltage of the AC input
- c) Half the peak voltage of the AC input
- d) None of the above

**Answer: b) Twice the peak voltage of the AC input**

**What is the type of output waveform produced by a full wave rectifier?**

- a) Sine wave
- b) Square wave
- c) Triangular wave
- d) None of the above

**Answer: d) None of the above (It is a pulsating DC waveform)**

**What is the range of the output voltage of a full wave rectifier circuit?**

- a) 0 to the peak voltage of the AC input
- b) 0 to twice the peak voltage of the AC input
- c) Equal to the RMS voltage of the AC input

**d) None of the above**

**Answer: b) 0 to twice the peak voltage of the AC input**

## Lec 37 - Full wave bridge rectifier

What is the rectification factor for a full wave bridge rectifier?

- a) 0.5
- b) 0.637
- c) 0.812
- d) 1

**Answer: c) 0.812**

How many diodes are used in a full wave bridge rectifier?

- a) 1
- b) 2
- c) 3
- d) 4

**Answer: d) 4**

What is the advantage of a full wave bridge rectifier over a half wave rectifier?

- a) It requires fewer diodes
- b) It provides a higher DC voltage output
- c) It is less complex
- d) It is more efficient

**Answer: b) It provides a higher DC voltage output**

What is the purpose of the smoothing capacitor in a full wave bridge rectifier?

- a) To reduce the ripple in the DC output
- b) To increase the voltage of the AC input
- c) To convert AC voltage to DC voltage
- d) To provide a constant voltage output

**Answer: a) To reduce the ripple in the DC output**

**What is the efficiency of a full wave bridge rectifier?**

- a) 25%
- b) 50%
- c) 75%
- d) 81.2%

**Answer: d) 81.2%**

**What is the RMS voltage of the AC input in a full wave bridge rectifier?**

- a) Peak voltage
- b) Peak-to-peak voltage
- c) Zero voltage
- d) Peak voltage divided by the square root of 2

**Answer: d) Peak voltage divided by the square root of 2**

**Which configuration of diodes is used in a full wave bridge rectifier?**

- a) Center-tap
- b) Half wave
- c) Full wave
- d) Bridge

**Answer: d) Bridge**

**What is the output voltage of a full wave bridge rectifier with an input voltage of 12V RMS?**

- a) 6.12V DC
- b) 7.32V DC
- c) 9.75V DC
- d) 12V DC

**Answer: c) 9.75V DC (calculated as 12V RMS x 0.812)**

**What is the disadvantage of a full wave bridge rectifier?**

- a) It is less efficient than a half wave rectifier
- b) It requires more diodes than a half wave rectifier
- c) It produces a lower DC output voltage than a half wave rectifier
- d) It is more complex than a half wave rectifier

**Answer: b) It requires more diodes than a half wave rectifier**

**What is the rectification efficiency of a full wave bridge rectifier?**

- a) 50%
- b) 75%
- c) 81.2%
- d) 100%

**Answer: c) 81.2%**

## Lec 38 - Filters' in Circuit Theory

**What is the purpose of a parallel clipper circuit?**

- A. To clip both positive and negative portions of the input signal
- B. To clip only the positive portion of the input signal
- C. To clip only the negative portion of the input signal
- D. None of the above

**Answer: A**

**What is the main component used in a parallel clipper circuit?**

- A. Resistor
- B. Capacitor
- C. Diode
- D. Inductor

**Answer: C**

**In a parallel clipper circuit, when the input signal is above the clipping level, what happens to the output signal?**

- A. It remains unchanged
- B. It is clipped at the positive voltage level
- C. It is clipped at the negative voltage level
- D. It is clipped at both the positive and negative voltage levels

**Answer: D**

**What is the voltage drop across a diode when it is forward biased?**

- A. 0 volts
- B. 0.6 volts
- C. 1 volt
- D. 2 volts

**Answer: B**

**What is the function of the capacitor in a parallel clipper circuit?**

- A. To charge and discharge the diode
- B. To smooth out the output signal
- C. To provide a path for the input signal to ground
- D. None of the above

**Answer: C**

**What is the main disadvantage of a parallel clipper circuit?**

- A. It is difficult to implement
- B. It can introduce distortion in the output signal
- C. It is only effective for low frequency signals
- D. It requires a high voltage power supply

**Answer: B**

**What is the difference between a series clipper and a parallel clipper circuit?**

- A. In a series clipper, the diode is in series with the input signal, while in a parallel clipper, the diode is in parallel with the input signal
- B. In a series clipper, the diode is in parallel with the input signal, while in a parallel clipper, the diode is in series with the input signal
- C. There is no difference between a series clipper and a parallel clipper circuit
- D. None of the above

**Answer: A**

**What is the clipping level in a parallel clipper circuit?**

- A. The voltage at which the diode becomes forward biased
- B. The voltage at which the diode becomes reverse biased
- C. The maximum voltage that the output signal can reach
- D. The minimum voltage that the output signal can reach

**Answer: A**

**What is the purpose of a load resistor in a parallel clipper circuit?**

- A. To limit the current through the diode
- B. To provide a path for the output signal to ground
- C. To provide a voltage drop across the output signal
- D. None of the above

**Answer: B**

**How can the clipping level in a parallel clipper circuit be changed?**

- A. By changing the value of the resistor in series with the diode
- B. By changing the value of the capacitor in parallel with the diode
- C. By changing the value of the load resistor
- D. By changing the bias voltage of the diode

**Answer: D**



## Lec 39 - Voltage multipliers

What is the output voltage of a Cockcroft-Walton multiplier circuit with four stages?

- A)  $V_{in}$
- B)  $2V_{in}$
- C)  $3V_{in}$
- D)  $4V_{in}$

**Answer: C)  $3V_{in}$**

What is the main application of voltage multipliers?

- A) Voltage amplification
- B) Voltage stabilization
- C) Voltage conversion
- D) Voltage inversion

**Answer: C) Voltage conversion**

Which type of voltage multiplier circuit is most efficient?

- A) Half-wave multiplier
- B) Full-wave multiplier
- C) Voltage doubler
- D) Voltage tripler

**Answer: B) Full-wave multiplier**

What is the function of the capacitors in a voltage multiplier circuit?

- A) To filter the output voltage
- B) To increase the output current
- C) To store and release energy
- D) To regulate the output voltage

**Answer: C) To store and release energy**

**How many diodes are used in a voltage doubler circuit?**

- A) 1
- B) 2
- C) 3
- D) 4

**Answer: B) 2**

**What is the output voltage of a voltage tripler circuit with a peak input voltage of 10V?**

- A) 10V
- B) 20V
- C) 30V
- D) 40V

**Answer: C) 30V**

**Which type of voltage multiplier circuit is used in CRT (Cathode Ray Tube) displays?**

- A) Voltage doubler
- B) Voltage tripler
- C) Voltage quadrupler
- D) Voltage quintupler

**Answer: C) Voltage quadrupler**

**What is the maximum output voltage of a voltage quadrupler circuit with a peak input voltage of 12V?**

- A) 24V
- B) 36V
- C) 48V
- D) 60V

**Answer: C) 48V**

**What is the main disadvantage of voltage multipliers?**

- A) High cost
- B) Low efficiency
- C) Limited output voltage range
- D) Complex circuit design

**Answer: B) Low efficiency**

**How many stages are typically used in a voltage multiplier circuit?**

- A) 1-2 stages
- B) 3-4 stages
- C) 5-6 stages
- D) 7-8 stages

**Answer: B) 3-4 stages**

## Lec 40 - Tunnel diode

What is the symbol for a tunnel diode?

- a) Zener diode symbol
- b) LED symbol
- c) Tunnel diode symbol
- d) Rectifier diode symbol

**Answer: c) Tunnel diode symbol**

What is the doping concentration range for a tunnel diode?

- a)  $10^{14}$  to  $10^{16}$   $\text{cm}^{-3}$
- b)  $10^{18}$  to  $10^{20}$   $\text{cm}^{-3}$
- c)  $10^{22}$  to  $10^{24}$   $\text{cm}^{-3}$
- d)  $10^{26}$  to  $10^{28}$   $\text{cm}^{-3}$

**Answer: b)  $10^{18}$  to  $10^{20}$   $\text{cm}^{-3}$**

Which of the following statements is true about the tunnel diode?

- a) It is a unipolar device
- b) It is a bipolar device
- c) It is a two-terminal device
- d) It is a three-terminal device

**Answer: b) It is a bipolar device**

Which of the following is NOT a characteristic of a tunnel diode?

- a) High forward resistance
- b) Negative resistance region
- c) Low breakdown voltage
- d) Fast switching speed

**Answer: a) High forward resistance**

**In which region of the voltage-current characteristic curve does the tunneling effect occur?**

- a) Forward bias region
- b) Reverse bias region
- c) Zero bias region
- d) Breakdown region

**Answer: c) Zero bias region**

**Which of the following is an application of the tunnel diode?**

- a) Voltage regulation
- b) Power amplification
- c) Phase shifting
- d) Frequency doubling

**Answer: d) Frequency doubling**

**What is the typical operating frequency range of a tunnel diode oscillator?**

- a) Less than 1 GHz
- b) 1-10 GHz
- c) 10-100 GHz
- d) More than 100 GHz

**Answer: c) 10-100 GHz**

**Which of the following is an advantage of the tunnel diode over other diodes?**

- a) Low cost
- b) High power handling capability
- c) High temperature stability
- d) High breakdown voltage

**Answer: c) High temperature stability**

**Which of the following is a disadvantage of the tunnel diode?**

- a) Low output power
- b) Limited frequency range
- c) High reverse leakage current
- d) High forward resistance

**Answer: b) Limited frequency range**

**In a tunnel diode, the tunneling effect results in:**

- a) Increased electron density in the conduction band
- b) Decreased electron density in the conduction band
- c) Increased hole density in the valence band
- d) Decreased hole density in the valence band

**Answer: a) Increased electron density in the conduction band**

## **Lec 41 - Directions of Currents in BJT**

**In which direction does the majority carrier flow in an NPN transistor?**

- a) From the base to the emitter
- b) From the emitter to the base
- c) From the collector to the base
- d) From the base to the collector**

**Answer: b) From the emitter to the base**

**In which direction does the minority carrier flow in an NPN transistor?**

- a) From the base to the emitter
- b) From the emitter to the base
- c) From the collector to the base
- d) From the base to the collector

**Answer: a) From the base to the emitter**

**In which direction does the majority carrier flow in a PNP transistor?**

- a) From the base to the emitter
- b) From the emitter to the base
- c) From the collector to the base
- d) From the base to the collector

**Answer: a) From the base to the emitter**

**In which direction does the minority carrier flow in a PNP transistor?**

- a) From the base to the emitter
- b) From the emitter to the base
- c) From the collector to the base
- d) From the base to the collector**

**Answer: b) From the emitter to the base**

**In an NPN transistor, the direction of the base current is \_\_\_\_\_ the direction of the emitter current.**

- a) opposite to
- b) same as
- c) perpendicular to
- d) unrelated to

**Answer: a) opposite to**

**In a PNP transistor, the direction of the base current is \_\_\_\_\_ the direction of the emitter current.**

- a) opposite to
- b) same as
- c) perpendicular to
- d) unrelated to

**Answer: b) same as**

**In an NPN transistor, the direction of the collector current is \_\_\_\_\_ the direction of the emitter current.**

- a) opposite to
- b) same as
- c) perpendicular to
- d) unrelated to

**Answer: b) same as**

**In a PNP transistor, the direction of the collector current is \_\_\_\_\_ the direction of the emitter current.**

- a) opposite to
- b) same as
- c) perpendicular to
- d) unrelated to

**Answer: a) opposite to**



**In which region of operation of a BJT does the collector current depend on the base current?**

- a) Cut-off region
- b) Active region
- c) Saturation region
- d) None of the above

**Answer: b) Active region**

**In which region of operation of a BJT does the collector current saturate?**

- a) Cut-off region
- b) Active region
- c) Saturation region
- d) None of the above

**Answer: c) Saturation region**

## Lec 42 - Collector Emitter Loop

**What is the voltage drop across the collector-emitter junction in a BJT when it is operating in the active region?**

- a. approximately zero
- b. approximately 0.2 volts
- c. approximately 0.6 volts
- d. approximately the same as the supply voltage

**Answer: c. approximately 0.6 volts**

**In a common emitter BJT configuration, which of the following currents flow in the collector-emitter loop?**

- a. only the collector current
- b. only the base current
- c. only the emitter current
- d. both the collector and emitter currents

**Answer: d. both the collector and emitter currents**

**What is the purpose of the collector resistor in a BJT circuit?**

- a. to limit the base current
- b. to provide negative feedback
- c. to stabilize the bias point
- d. to provide a load for the transistor

**Answer: d. to provide a load for the transistor**

**What is the typical value of the collector current in a BJT operating in the active region?**

- a. microamps

- b. milliamps
- c. amps
- d. tens of amps

**Answer: b. milliamps**

**Which of the following is true about the direction of the collector current in a PNP transistor?**

- a. it flows from the emitter to the collector
- b. it flows from the collector to the emitter
- c. it flows in both directions
- d. it does not flow in a PNP transistor

**Answer: a. it flows from the emitter to the collector**

**What is the direction of the voltage drop across the collector-emitter junction in a BJT operating in the active region?**

- a. positive on the collector and negative on the emitter
- b. negative on the collector and positive on the emitter
- c. positive on both the collector and emitter
- d. negative on both the collector and emitter

**Answer: b. negative on the collector and positive on the emitter**

**Which of the following is true about the direction of the base current in a BJT?**

- a. it flows from the emitter to the collector
- b. it flows from the collector to the emitter
- c. it flows in both directions
- d. it does not flow in a BJT

**Answer: b. it flows from the collector to the emitter**

**In a common base BJT configuration, which of the following currents flow in the collector-emitter loop?**

- a. only the collector current
- b. only the base current
- c. only the emitter current
- d. both the collector and emitter currents

**Answer: a. only the collector current**

**What is the typical value of the voltage drop across the base-emitter junction in a BJT operating in the active region?**

- a. approximately zero
- b. approximately 0.2 volts
- c. approximately 0.6 volts
- d. approximately the same as the supply voltage

**Answer: c. approximately 0.6 volts**

**Which of the following is true about the direction of the emitter current in a BJT?**

- a. it flows from the emitter to the collector
- b. it flows from the collector to the emitter
- c. it flows in both directions
- d. it does not flow in a BJT

**Answer: a. it flows from the emitter to the collector**

## Lec 43 - Emitter-Stabilized Bias Circuit Load Line Analysis

In an emitter-stabilized bias circuit, the base voltage is:

- A) fixed
- B) variable
- C) equal to the collector voltage
- D) equal to the emitter voltage

**Answer: B) variable**

What is the purpose of the emitter resistor in an emitter-stabilized bias circuit?

- A) to provide a voltage drop across the base-emitter junction
- B) to provide a voltage drop across the collector-emitter junction
- C) to stabilize the bias point against changes in transistor characteristics
- D) to increase the gain of the circuit

**Answer: C) to stabilize the bias point against changes in transistor characteristics**

In an emitter-stabilized bias circuit, the load line represents:

- A) the voltage across the transistor
- B) the current through the transistor
- C) the power dissipated by the transistor
- D) the operating point of the transistor

**Answer: B) the current through the transistor**

If the emitter resistor in an emitter-stabilized bias circuit is increased, what happens to the operating point?

- A) it moves up the load line
- B) it moves down the load line
- C) it stays at the same point on the load line
- D) it cannot be determined without additional information

**Answer: B) it moves down the load line**

**In an emitter-stabilized bias circuit, what is the effect of increasing the collector resistor?**

- A) it increases the voltage gain of the circuit
- B) it decreases the voltage gain of the circuit
- C) it has no effect on the voltage gain of the circuit
- D) it causes the circuit to become unstable

**Answer: B) it decreases the voltage gain of the circuit**

**The operating point of an emitter-stabilized bias circuit is determined by:**

- A) the intersection of the load line and the transistor characteristic curve
- B) the value of the emitter resistor
- C) the value of the collector resistor
- D) the value of the base resistor

**Answer: A) the intersection of the load line and the transistor characteristic curve**

**In an emitter-stabilized bias circuit, what is the purpose of the bypass capacitor?**

- A) to filter out high-frequency signals
- B) to provide a low-impedance path for AC signals
- C) to reduce the DC voltage drop across the emitter resistor
- D) to prevent oscillations in the circuit

**Answer: C) to reduce the DC voltage drop across the emitter resistor**

**The Q point of an emitter-stabilized bias circuit is:**

- A) the same as the operating point
- B) the point where the load line intersects the transistor characteristic curve
- C) the point where the load line intersects the voltage axis
- D) the point where the load line intersects the current axis

**Answer: A) the same as the operating point**

**What is the effect of decreasing the value of the base resistor in an emitter-stabilized bias circuit?**

- A) it increases the voltage gain of the circuit
- B) it decreases the voltage gain of the circuit
- C) it has no effect on the voltage gain of the circuit
- D) it causes the circuit to become unstable

**Answer: D) it causes the circuit to become unstable**

**The purpose of the load line in an emitter-stabilized bias circuit is to:**

- A) represent the voltage gain of the circuit
- B) represent the current gain of the circuit
- C) determine the operating point of the circuit
- D) determine the bias point of the circuit

**Answer: C) determine the operating point of the circuit**

## Lec 44 - Circuit Load Line Analysis

**In an emitter-stabilized bias circuit, the base voltage is:**

- A) fixed
- B) variable
- C) equal to the collector voltage
- D) equal to the emitter voltage

**Answer: B) variable**

**What is the purpose of the emitter resistor in an emitter-stabilized bias circuit?**

- A) to provide a voltage drop across the base-emitter junction
- B) to provide a voltage drop across the collector-emitter junction
- C) to stabilize the bias point against changes in transistor characteristics
- D) to increase the gain of the circuit

**Answer: C) to stabilize the bias point against changes in transistor characteristics**

**In an emitter-stabilized bias circuit, the load line represents:**

- A) the voltage across the transistor
- B) the current through the transistor
- C) the power dissipated by the transistor
- D) the operating point of the transistor

**Answer: B) the current through the transistor**

**If the emitter resistor in an emitter-stabilized bias circuit is increased, what happens to the operating point?**

- A) it moves up the load line
- B) it moves down the load line
- C) it stays at the same point on the load line
- D) it cannot be determined without additional information

**Answer: B) it moves down the load line**



**In an emitter-stabilized bias circuit, what is the effect of increasing the collector resistor?**

- A) it increases the voltage gain of the circuit
- B) it decreases the voltage gain of the circuit
- C) it has no effect on the voltage gain of the circuit
- D) it causes the circuit to become unstable

**Answer: B) it decreases the voltage gain of the circuit**

**The operating point of an emitter-stabilized bias circuit is determined by:**

- A) the intersection of the load line and the transistor characteristic curve
- B) the value of the emitter resistor
- C) the value of the collector resistor
- D) the value of the base resistor

**Answer: A) the intersection of the load line and the transistor characteristic curve**

**In an emitter-stabilized bias circuit, what is the purpose of the bypass capacitor?**

- A) to filter out high-frequency signals
- B) to provide a low-impedance path for AC signals
- C) to reduce the DC voltage drop across the emitter resistor
- D) to prevent oscillations in the circuit

**Answer: C) to reduce the DC voltage drop across the emitter resistor**

**The Q point of an emitter-stabilized bias circuit is:**

- A) the same as the operating point
- B) the point where the load line intersects the transistor characteristic curve
- C) the point where the load line intersects the voltage axis
- D) the point where the load line intersects the current axis

**Answer: A) the same as the operating point**

**What is the effect of decreasing the value of the base resistor in an emitter-stabilized bias circuit?**

- A) it increases the voltage gain of the circuit
- B) it decreases the voltage gain of the circuit
- C) it has no effect on the voltage gain of the circuit
- D) it causes the circuit to become unstable

**Answer: D) it causes the circuit to become unstable**

**The purpose of the load line in an emitter-stabilized bias circuit is to:**

- A) represent the voltage gain of the circuit
- B) represent the current gain of the circuit
- C) determine the operating point of the circuit
- D) determine the bias point of the circuit

**Answer: C) determine the operating point of the circuit**

## Lec 45 - Bridge rectifier

What is the rectification factor for a full wave bridge rectifier?

- a) 0.5
- b) 0.637
- c) 0.812
- d) 1

**Answer: c) 0.812**

How many diodes are used in a full wave bridge rectifier?

- a) 1
- b) 2
- c) 3
- d) 4**

**Answer: d) 4**

What is the advantage of a full wave bridge rectifier over a half wave rectifier?

- a) It requires fewer diodes
- b) It provides a higher DC voltage output
- c) It is less complex
- d) It is more efficient

**Answer: b) It provides a higher DC voltage output**

What is the purpose of the smoothing capacitor in a full wave bridge rectifier?

- a) To reduce the ripple in the DC output
- b) To increase the voltage of the AC input
- c) To convert AC voltage to DC voltage
- d) To provide a constant voltage output

**Answer: a) To reduce the ripple in the DC output**

**What is the efficiency of a full wave bridge rectifier?**

- a) 25%
- b) 50%
- c) 75%
- d) 81.2%

**Answer: d) 81.2%**

**What is the RMS voltage of the AC input in a full wave bridge rectifier?**

- a) Peak voltage
- b) Peak-to-peak voltage
- c) Zero voltage
- d) Peak voltage divided by the square root of 2**

**Answer: d) Peak voltage divided by the square root of 2**

**Which configuration of diodes is used in a full wave bridge rectifier?**

- a) Center-tap
- b) Half wave
- c) Full wave
- d) Bridge**

**Answer: d) Bridge**

**What is the output voltage of a full wave bridge rectifier with an input voltage of 12V RMS?**

- a) 6.12V DC
- b) 7.32V DC
- c) 9.75V DC**
- d) 12V DC

**Answer: c) 9.75V DC (calculated as 12V RMS x 0.812)**

**What is the disadvantage of a full wave bridge rectifier?**

- a) It is less efficient than a half wave rectifier
- b) It requires more diodes than a half wave rectifier
- c) It produces a lower DC output voltage than a half wave rectifier
- d) It is more complex than a half wave rectifier

**Answer: b) It requires more diodes than a half wave rectifier**

**What is the rectification efficiency of a full wave bridge rectifier?**

- a) 50%
- b) 75%
- c) 81.2%
- d) 100%**

**Answer: c) 81.2%**

