**Questions and Answers**

**Quiz 1:**

**1. Define a semiconductor diode.**

The semiconductor diode is created by joining an -type and a -type material together, that is, joining of one material with a majority carrier of electrons to one with a majority carrier of holes.

**2. Define the depletion layer.**

The electrons and the holes in the region of the junction combine, resulting in a lack of free carriers in the region near the junction. The only particles in this region are the positive and the negative ions remaining once the free carriers have been absorbed. This region of uncovered positive and negative ions is called the depletion region due to the depletion of free carriers in the region.

**3. What do you mean by forward biased?**

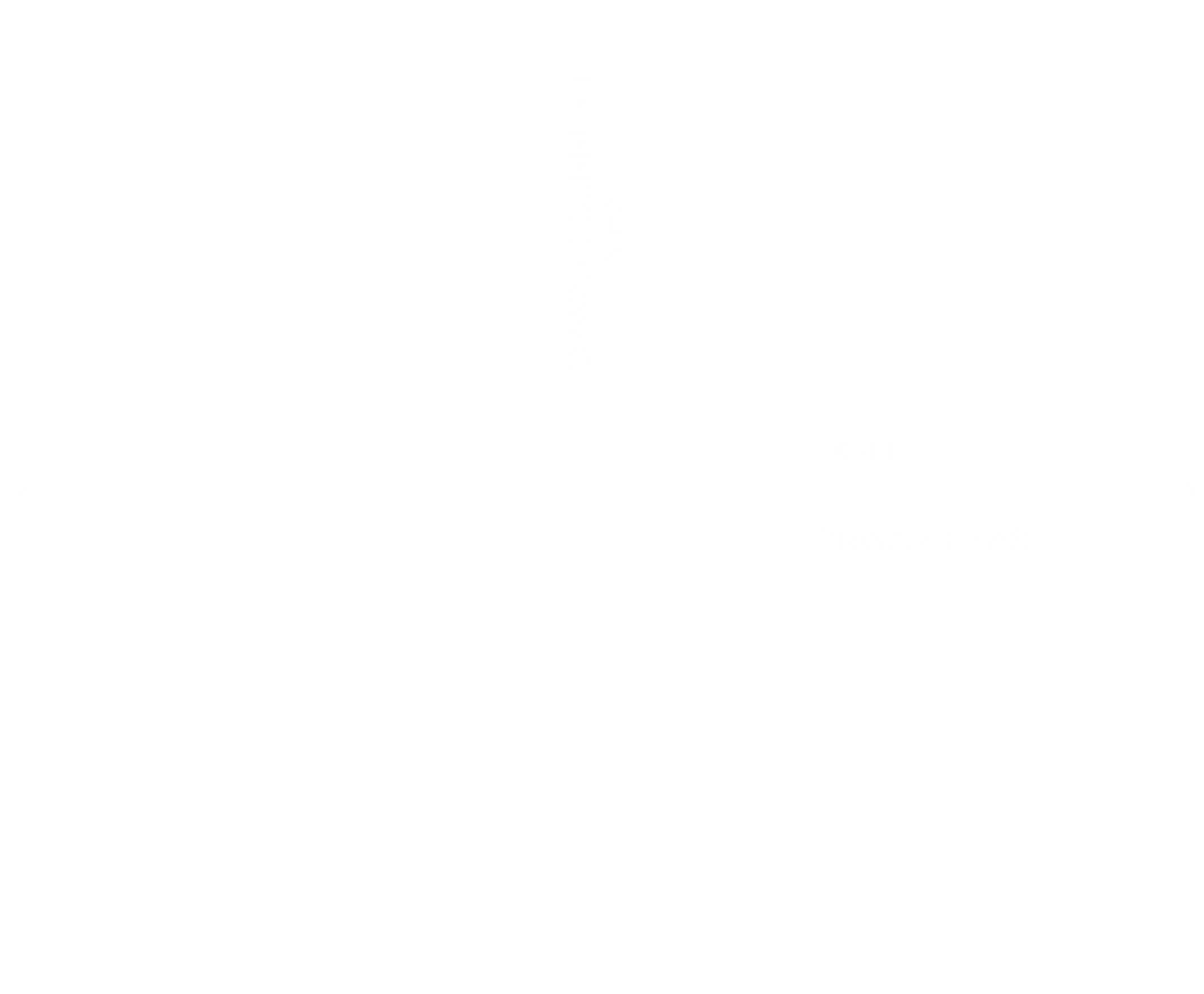
A forward-bias or on condition is established by applying the positive potential to the -type material and the negative potential to the -type material. The application of a forward-bias potential pressurizes electrons in the -type material and holes in the -type material to recombine with the ions near the boundary and reduce the width of the depletion region. The reduction in the width of the depletion region results in a heavy majority flow across the junction. As the applied bias increases in magnitude, the depletion region continues to decrease in width until a flood of electrons can pass through the junction, resulting in an exponential rise in current

**4. What do you mean by reverse biased?**

In reverse bias condition the positive terminal is connected to the -type material and the negative terminal is connected to the -type material. The depletion region widens and causes too great a barrier for the majority carriers to overcome, effectively reducing the majority carrier flow to zero. But the number of minority carriers entering the depletion region does not change. This causes the reverse saturation current exist under reverse-bias conditions.

**5. Define Knee voltage?**

The forward voltage at which the flow of current during the PN Junction begins increasing quickly is known as knee voltage.



**6. Define breakdown voltage?**

For diodes, the breakdown voltage is the minimum reverse voltage that makes the diode conduct appreciably in reverse.

**7. Define maximum forward current?**

The maximum value of the forward current that a PN junction or diode can carry without damaging the device is called the maximum forward current.

**8. Define maximum power rating?**

The maximum power rating is defined as the maximum power that a PN junction or diode can dissipate without damaging the device itself.

**9. What is an ideal diode?**

An ideal diode is a diode that acts like a perfect conductor when voltage is applied in forward bias and like a perfect insulator when voltage is applied in reverse bias.

**10. What are the applications of PN diodes?**

Applications include LED lighting, temperature sensors, circuits' rectifiers, varactors for voltage-controlled oscillators, etc.

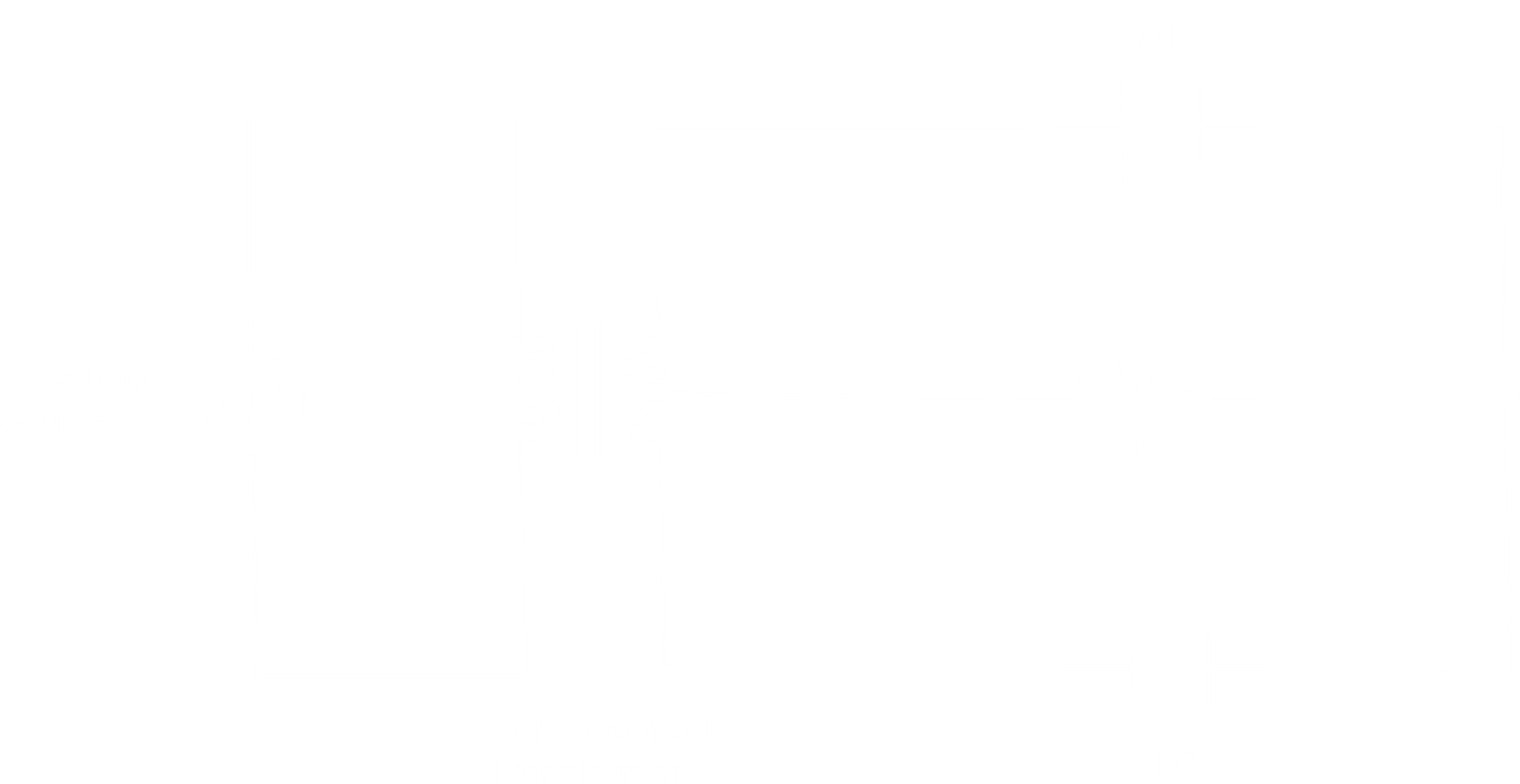
**Quiz 2:**

**1. Define a full wave rectifier.**

A full wave rectifier circuit produces an output voltage or current which is purely DC, converting both halves of an AC signal into a pulsating DC signal.

**2. What are the different types of full wave rectifiers?**

Center tapped full wave rectifier and full wave bridge rectifier



**3. How many diodes are used in full wave rectifier?**

There are 2 diodes in center-tapped full wave rectifiers and 4 in full wave bridge rectifiers.

**4. State the disadvantages of center tapped wave rectifiers.**

* It is expensive to manufacture a center tapped transformer which produces equal voltages on each half of the secondary windings.
* The output voltage is half of the secondary voltage, as each diode utilizes only one half of the transformer’s secondary voltage.
* The PIV (peak inverse voltage) of a diode used is twice that of the diode used in the half wave rectifier, so the diodes used must have high PIV.

**5. What is the ripple factor for a full wave rectifier?**

0.48

**6. What is the efficiency of a full wave rectifier?**

81.2%

**7. State the advantages of bridge rectifiers.**

* The rectification efficiency of a full-wave rectifier is double of that of a half-wave rectifier.
* There is higher output voltage, higher output power and higher Transformer Utilization Factor in case of a full-wave rectifier.
* The ripple voltage is low and of higher frequency, in case of full-wave rectifier so simple filtering circuits are required.
* No center tap is required in the transformer secondary so in case of a bridge rectifier, the transformer required is simpler. If stepping up or stepping down of voltage is not required, the transformer can be eliminated even.
* For a given power output, power transformer of smaller size can be used in case of the bridge rectifier because the current in both primary and secondary windings of the supply transformer flow for the entire ac cycle.

**8. Write one feature of full wave rectifiers?**

It converts the alternating voltage into pulsating direct voltage.

**9. Define the transformer utilization factor.**

The transformer utilization factor (TUF) of a rectifier circuit is the ratio of the DC power at the load resistor and the AC rating of the secondary coil of a transformer.

where , the rating of the transformer is

**10. Write the equation for DC current.**

Ohm’s Law:

Joule’s Law:

where voltage ()

current flow ()

resistance ()

power ()

**Quiz 3:**

**1. What is a filter?**

A filter is a device or process that removes some unwanted components or features from a signal.

**2. State some commonly used filters.**

Low-pass filters, high-pass filters, band-pass filters and band-reject filters.

**3. What is the equation of dc output voltage?**

**4. When can we use an inductor as a filter?**

If an inductor is inserted between a rectifier and a load resistance, when the output passes through the inductor, it offers a high resistance to the A.C. components and no resistance to DC components. Therefore, AC components of the rectified output are blocked and only the DC components reach the load.

**5. What happens when the filter capacitor value is larger?**

For filter capacitors, it is normal to have larger values. However, beyond a certain point, the benefits gained are no longer worth the money spent on making the device and the physical size of the device.