Warm greetings:

Dear students

Welcome all. In this class we are going to discuss about

- ☞ Rectification
- ☞ half wave rectifier
- ☞ full wave rectifier

Rectification:

The process in which alternating voltage or alternating current is converted into direct voltage or direct current is known as rectification. The device used for this process is called as rectifier. In this section, we will discuss two types of rectifiers namely,

- half wave rectifier and
- full wave rectifier

i) Half wave rectifier circuit:

- ❖ The half wave rectifier circuit consists of a transformer, a *p-n* junction diode and a resistor (Figure 10.17(a)).
- ❖ In a half wave rectifier circuit, either a positive half or the negative half of the AC input is passed through by the diode while the other half is blocked.
- ❖ Only one half of the input wave is rectified. Therefore, it is called half wave rectifier. Here, a *p-n* junction diode acts as a rectifier diode.

During the positive half cycle:

⇒ When the positive half cycle of the AC input signal passes through the circuit, terminal *A* becomes positive with respect to terminal *B*.

⇒ The diode is forward biased and hence it conducts.

⇒ The current flows through the load resistor R_L and the AC voltage developed across R_L constitutes the output voltage $V0$ and the waveform of the output voltage is shown in Figure 10.17(b).

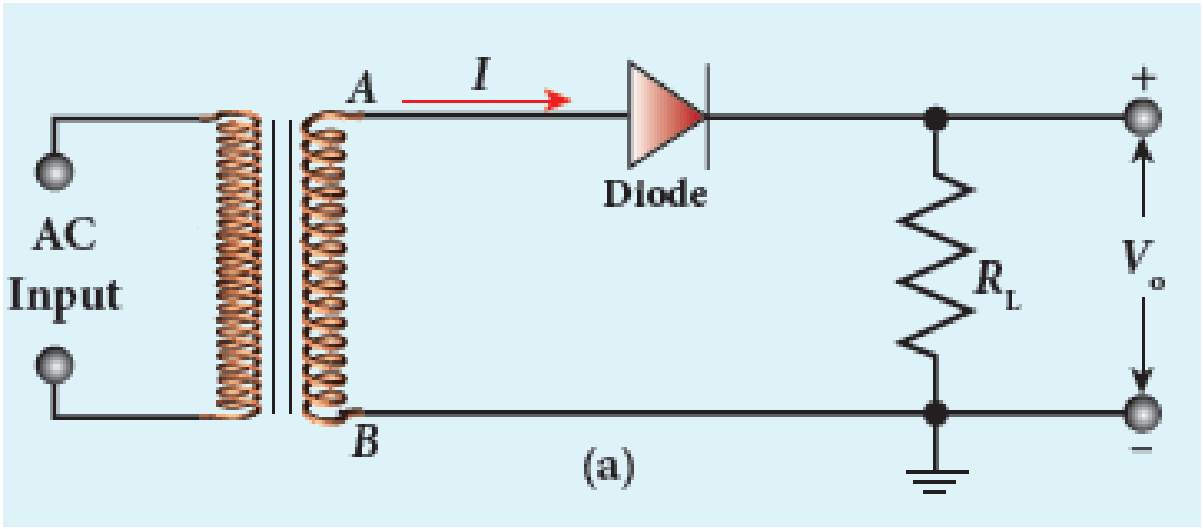
During the negative half cycle:

⇒ When the negative half cycle of the AC input signal passes through the circuit, terminal *A* is negative with respect to terminal *B*.

⇒ Now the diode is reverse biased and does not conduct.

⇒ Hence no current passes through R_L. The reverse saturation current in a diode is negligible.

⇒ Since there is no voltage drop across R_L, the negative half cycle of AC supply is suppressed at the output.



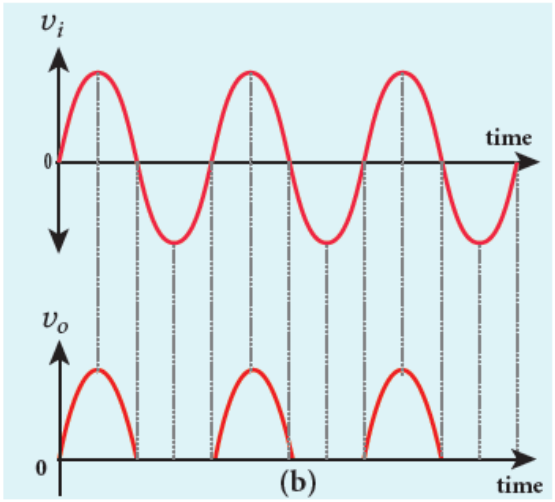


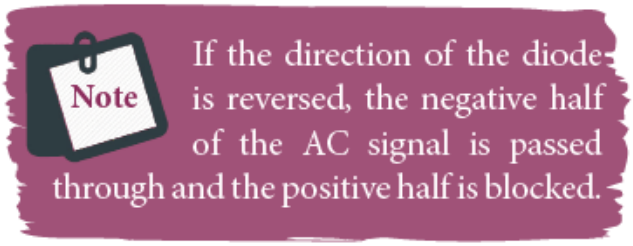
Figure 10.17 (a) Half wave rectifier circuit (b) Input and output waveforms

⇒ The output of the half wave rectifier is not a steady DC voltage but a pulsating wave.

⇒ This pulsating voltage cannot be used for electronic equipments.

⇒ A constant or a steady voltage is required which can be obtained with the help of filter circuits and voltage regulator circuits.

⇒ **Efficiency (η) is the ratio of the output DC power to the AC input power supplied to the circuit**. Its value for half wave rectifier is 40.6 %.



ii) Full wave rectifier:

- The positive and negative half cycles of the AC input signal are rectified in this circuit and hence it is called the full wave rectifier.
- The circuit is shown in Figure 10.18(a). It consists of two *p-n* junction diodes, a centre tap transformer and a load resistor *RL*.
- The centre is usually taken as the ground or zero voltage reference point. With the help of the centre tap transformer, each diode rectifies one half of the total secondary voltage.

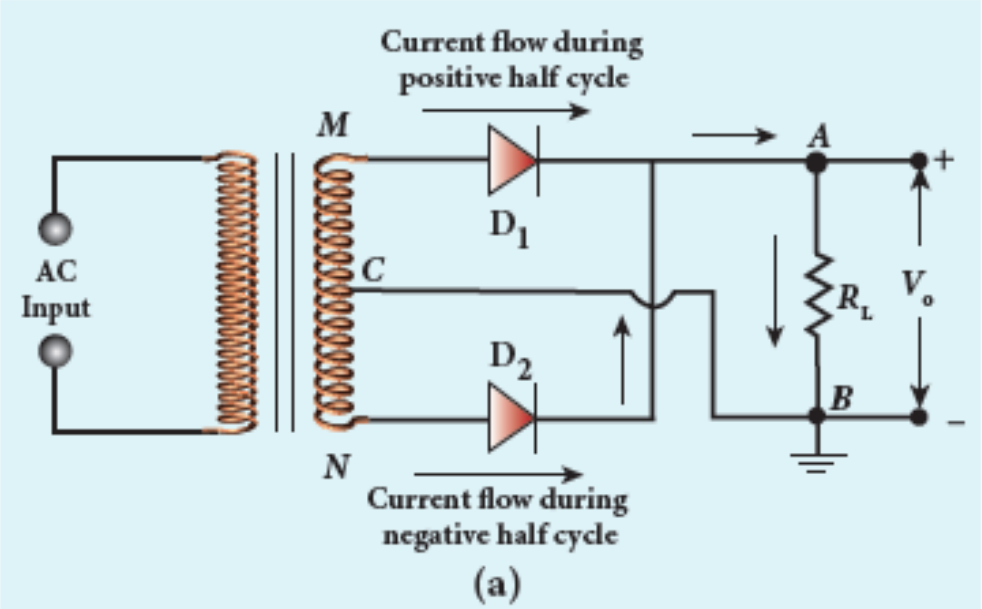
During positive half cycle

- When the positive half cycle of the AC input signal passes through the circuit, terminal *M* is positive, *C* is at zero potential and *N* is at negative potential.
- This forward biases diode D_1 and reverse biases diode D_2. Hence, being forward biased, diode D_1conducts and current flows along the path $MDABC_1$.

During negative half cycle

- When the negative half cycle of the AC input signal passes through the circuit, terminal *N* becomes positive, *C* is at zero potential and *M* is at negative potential.
- This forward biases diode D_2 and reverse biases diode D_1. Hence, being forward biased, diode D_2 conducts and current flows along the path$NDABC_2$.
- During both postive and negative half cycles of the input signal, the current flows through the load in the same direction.
- The output signal corresponding to the input signal is shown in Figure 10.18(b). Though both half cycles of AC input are rectified, the output is still pulsating in nature.

- The efficiency (η) of full wave rectifier is twice that of a half wave rectifier and is found to be 81.2 %.
- It is because of power losses in the winding, the diode and the load resistance.



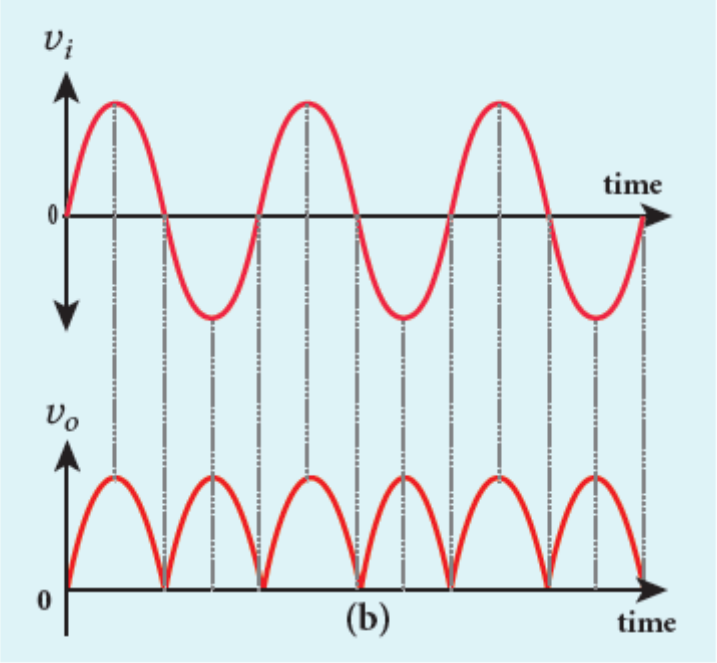


Figure 10.18 (a) Full wave rectifier circuit (b) Input and output waveforms

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