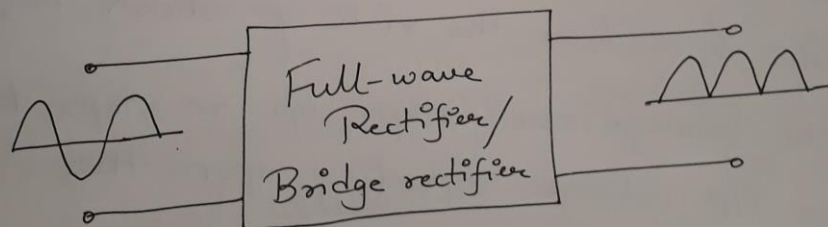
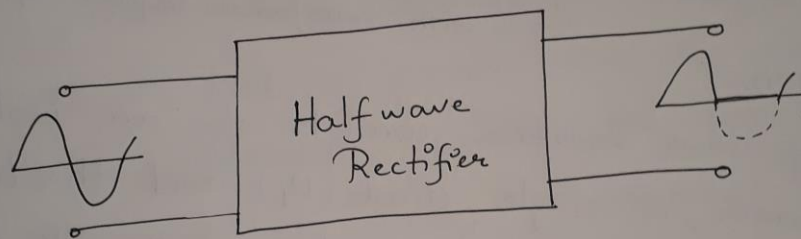


* Rectifiers:-

01
28/07/17

A device, such as the semiconductor diode, which is capable of converting a sinusoidal input waveform (whose average value is zero) into a uni-directional waveform, with a non-zero average component, is called a rectifier



- Types of Rectifiers:-
1. Half-wave rectifier.
 2. a) Full-wave rectifier.
b) Bridge rectifier.

02

Half-Wave Rectifier :-

(fig a) Basic circuit of half-wave rectifier with transformer coupled input voltage

Description:-

- The half-wave rectifier consists of an isolating transformer, a single diode (D_1) and the load (R_L)
- Transformer isolates the rectifier circuit from ac mains & reduces the risk of shock hazards.
- Also, the transformer steps up or steps down the ac IP voltage depending upon the requirement.
- The secondary voltage (V_i) is a step-down version of ac main's voltage.

→ Next, we will discuss how diode (D_1) conducts during positive half cycle.

Working:-

03

- The AC voltage at the secondary winding (V_1) changes the polarity after every half cycle. Thus, during positive half cycle point A is positive and point B is negative.

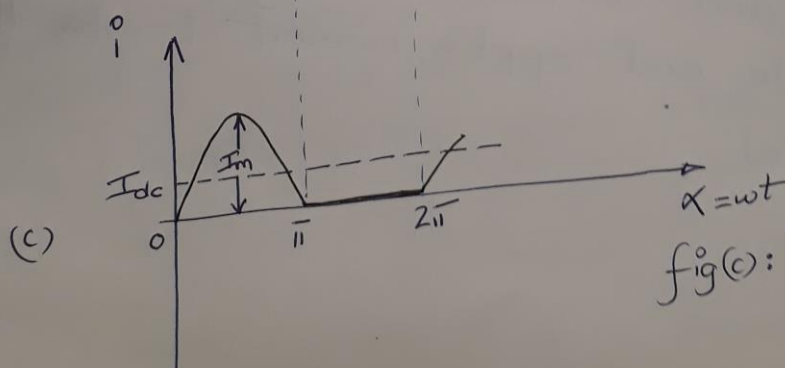
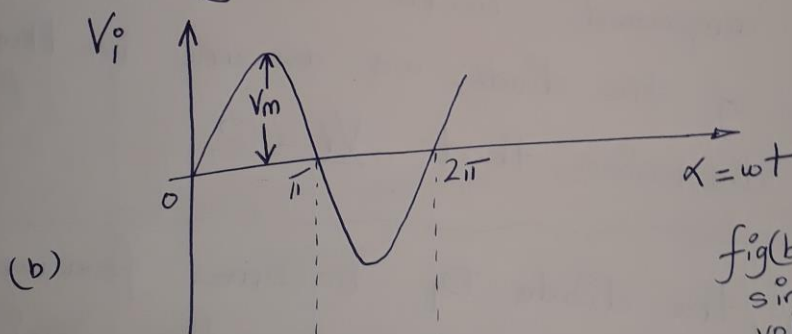
Note:-

Since in a rectifier circuit, the input $V_i = V_m \sin \omega t$ has a peak value V_m which is very large compared with the cut-in voltage V_s (or $V_{0, on}$) of the diode, we assume in the following discussion that $V_s = 0$

- Therefore, the diode D_1 becomes forward biased and conducts during the positive half cycle and supplies current 'i' to the load (R_L)

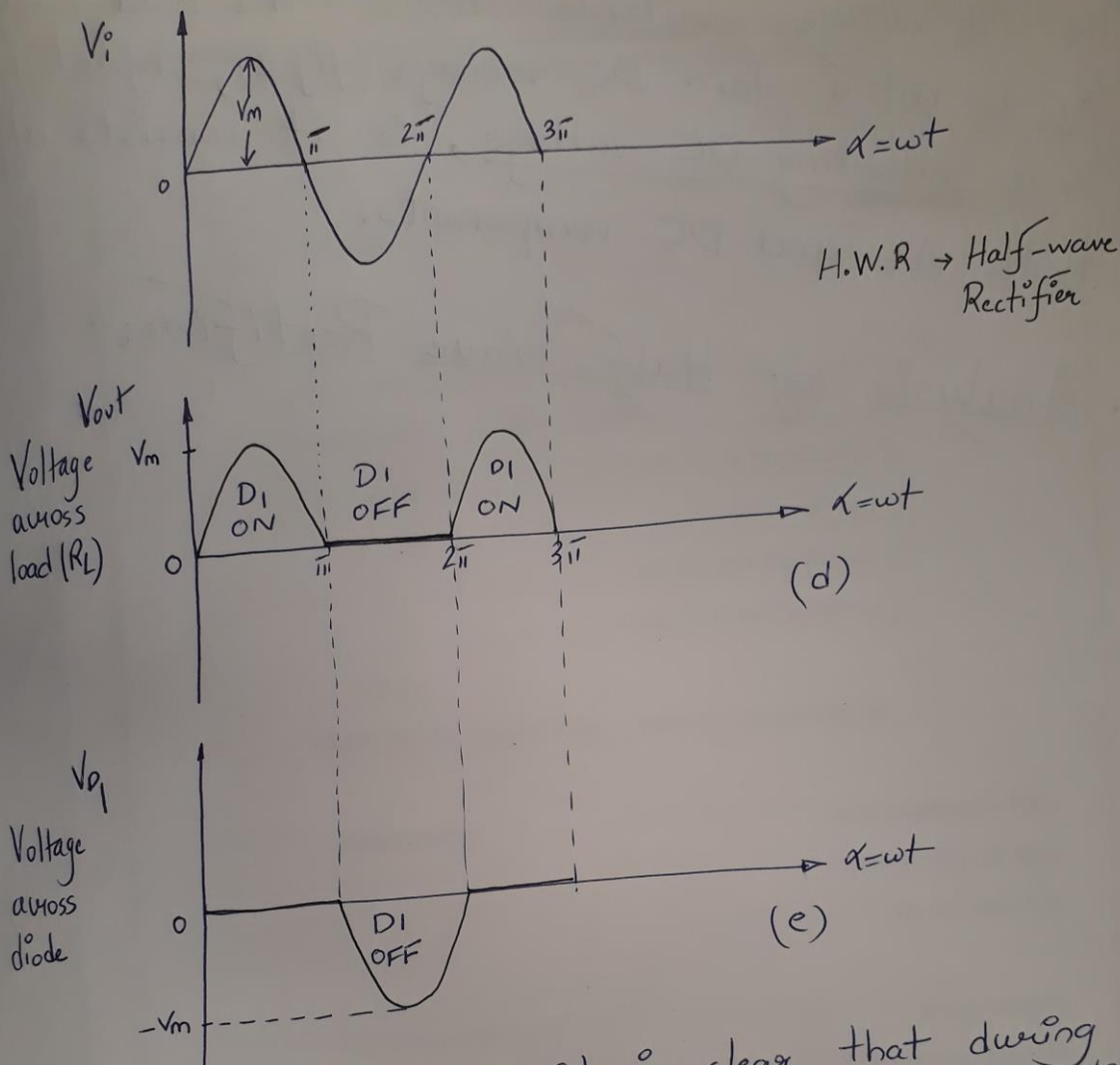
Working of Half wave rectifier with waveforms

- During the negative half cycle, point A becomes negative and point B becomes positive. Therefore, the diode D_1 becomes reverse biased. So, it does not conduct and therefore there is no load current ' i ' during the negative half cycle.
- The cycle is repeated again for the next cycle. Thus the diode converts the alternating current into unidirectional current.



Working of Half wave rectifier with waveforms

05



- From the waveform (e), it is clear that during negative half cycle i.e. when diode is not conducting, during this time voltage across diode D_1 is $-V_m$ and diode is supposed to withstand this Reverse voltage, i.e. in H.W.R, PIV (Peak inverse voltage) rating of the diode is supposed to be V_m .

Working of Half wave rectifier with waveforms

• The o/p voltage available across the load R_L is not a plain DC voltage (fig d), infact it is a pulsating DC voltage, ie it consists of both AC and DC components.