SINGLE PHASE BRIDGE INVERTER WITH RL LOAD

The operation of the circuit can be divided into four intervals or modes. The waveforms are as shown in Fig. 8.13.

Interval I ($t_1 - t_2$):

At instant tl, the pair of transistors Q1 and Q2 is turned on. The transistors are assumed to be ideal switches. Therefore point A gets connected to positive point of dc source V through Q, and point B gets connected to negative point of input supply.

The output voltage Vo == + V as shown in Fig 8.11(a). The load current starts increasing exponentially due to the inductive nature of the load.

The instantaneous current through Q1 and Q2 is equal to the instantaneous load current. The energy is stored into the inductive load during this interval of operation.

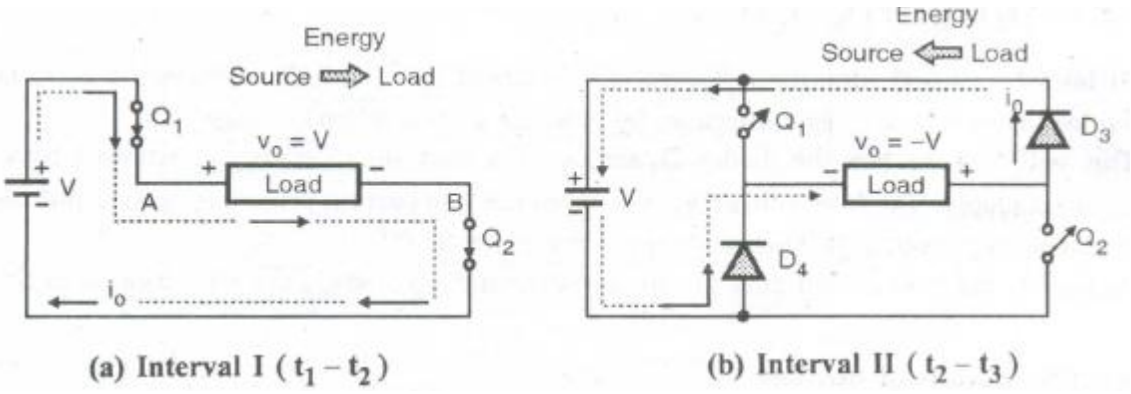

Fig.8.11

Interval II (t2 - t3) :

• At instant t2 both the transistors Q1 and Q2 are turned off. But the load current does not reduce to 0 instantaneously, due to its inductive nature.

• So in order to maintain the flow of current in the same direction there is a self induced voltage across the load. The polarity of this voltage is exactly opposite to that in the previous mode.

• Thus output voltage becomes negative equal to - V. But the load current continues to now in the same direction, through D3 andD4 as shown in Fig. 8.11(b).

• Thus the stored energy in the load inductance is returned back to the source in this mode. The diodes D1 to D4 are therefore known as the feedback diodes.

• The load current decreases exponentially and goes to 0 at instant t3 when all the energy stored ill the load is returned back to supply. D3 and D4 are turned off at t3·

Interval III ($t_3 - t_4$)

• At instant t3 ' Q3 and Q4 are turned on simultaneously. The load voltage remains negative equal to - V but the direction of load current will reverse and become negative.

• The current increases exponentially in the negative direction. And the load again stores energy) in this mode of operation. This is as shown in Fig. 8.12(a) .

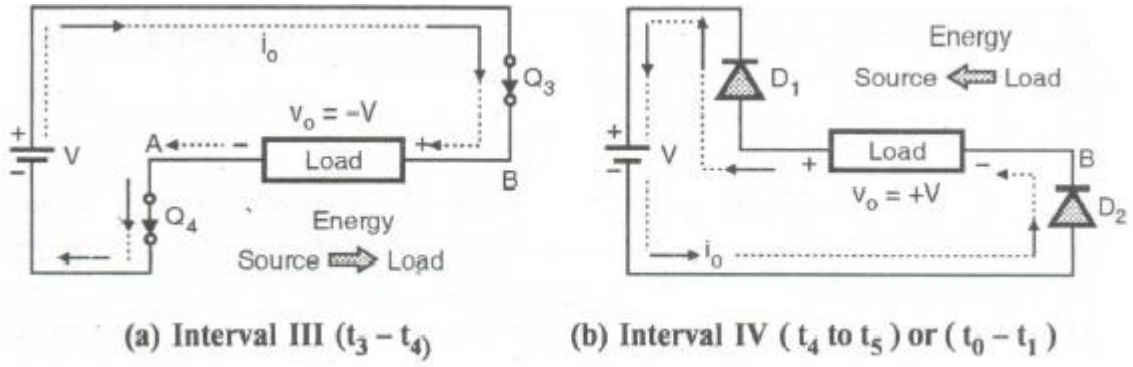

Fig.8.12

Interval IV (t_4 to t_5) or (t_0 to t_1)

• At instant t4 or to the transistors Q3 and Q4 are turned off. The load inductance tries to maintain the load current in the same direction, by inducing a positive load voltage.
• This will forward bias the diodes D) and D2. The load stored energy is returned back to the input dc supply. The load voltage Vo = + V but the load current remains negative and decrease exponentially towards 0. This is as shown in Fig. 8.12(b).
• At t5 or t1 the load current goes to zero and transistors Q1 and Q2 can be turned on again.

Conduction period of devices:
• The conduction period with a very highly inductive load, will be T*01*4 or 90 0 for all the transistors as well as the diodes.
• The conduction period of transistors will increase towards To/2.*or* 180^0 with increase in th1 load power factor. (i.e., as the load becomes more and more resistive).

Source : http://elearningatria.files.wordpress.com/2013/10/ece-vii-power-electronics-10ec73-notes.pdf