Single Phase Full Bridge Inverter

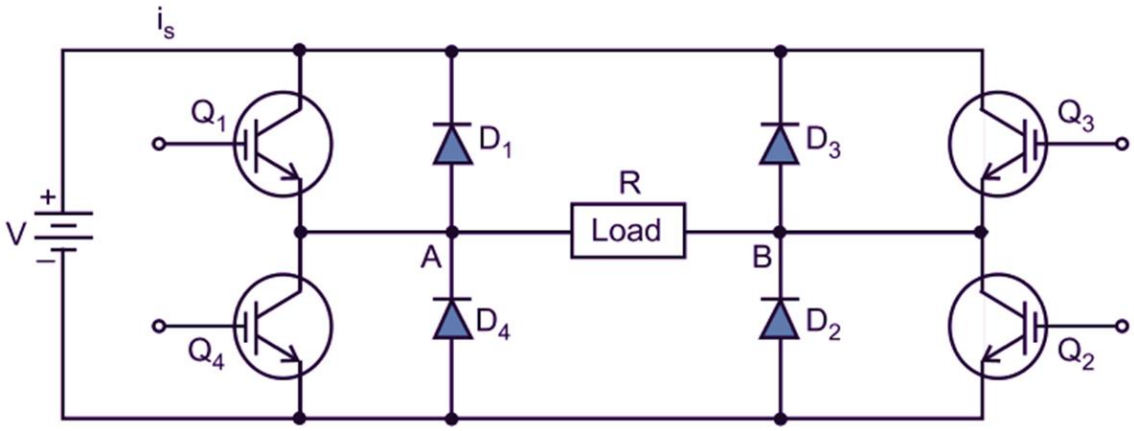

Fig. 1: Single Phase Full Bridge Inverter

Fig. 1 shows a single-phase full bridge inverter with a resistive load. The arrangement of the inverter consists of four transistors, (MOSFET or IGBT). To obtain an ac waveform at the output, the transistors are turned ON and OFF in pairs of Q_1, Q_2, and Q_3, Q_4. Thus, to obtain a positive voltage (+V) across the load, the transistors Q_1 and Q_2 are turned ON (kept conducting) simultaneously, whereas to obtain a negative voltage (-V) at the output i.e., across the load, the transistors Q_1 and Q_2 need to be turned ON. The diodes D_1, D_2, D_3, and D_4 are acting as feedback elements as the energy is feedback to the source through them when the load is inductive in nature.

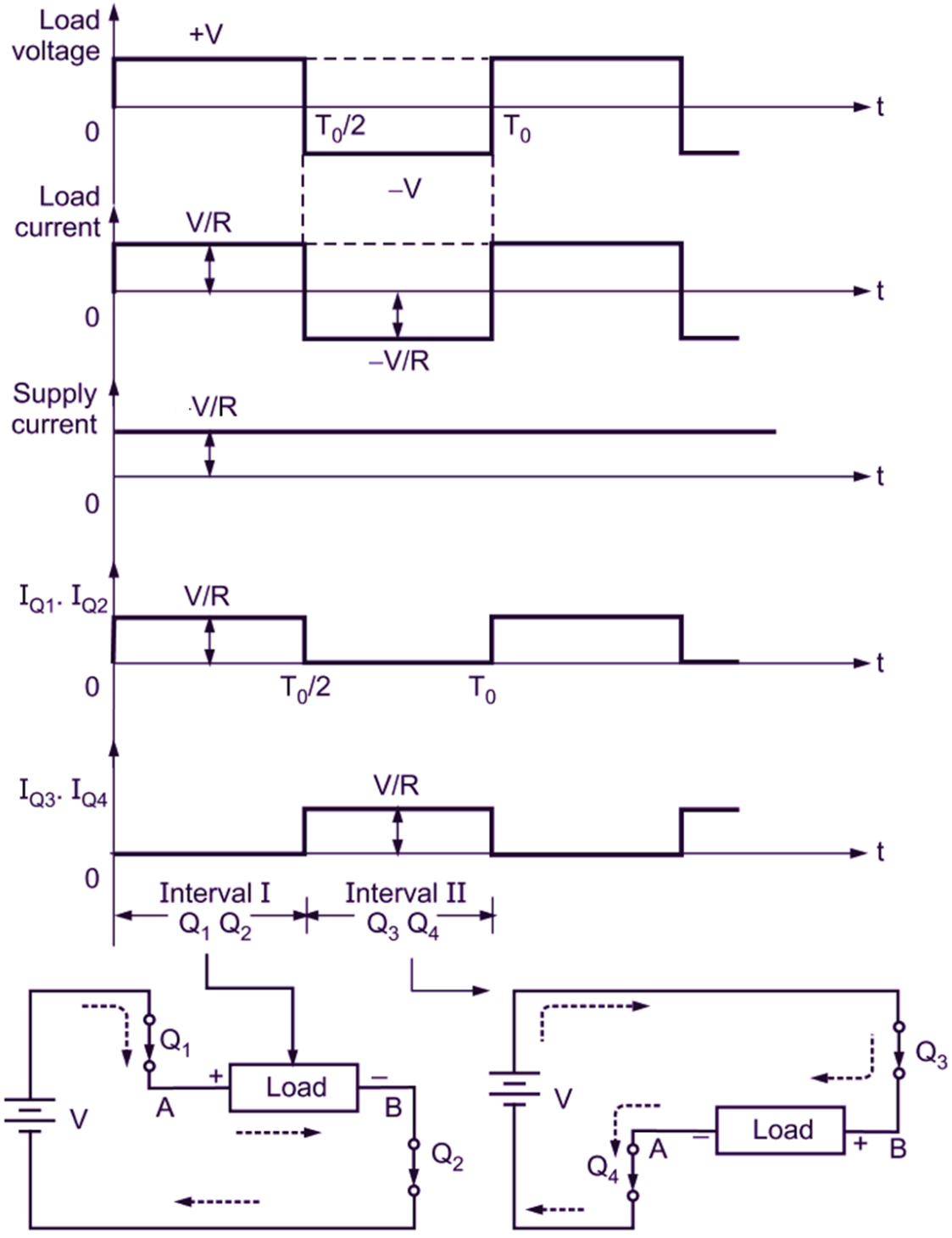

Fig. 2: Voltage and current waveforms with resistive load

Working of Single-Phase Full Bridge Inverter

The working of the single-phase bridge inverter with resistive load is explained in the following time intervals (modes):

Interval 1 (0 – $T_0/2$) [Mode -1]:

During this interval, the transistors Q_1 and Q_2 are kept conducting simultaneously. Thus, the load voltage that appeared across the resistive load is +V volts and the direction (flow) of the current is from A to B. The transistors act as a closed switch when they are conducting. The equivalent circuit of Mode-I is shown in following Fig. 3.

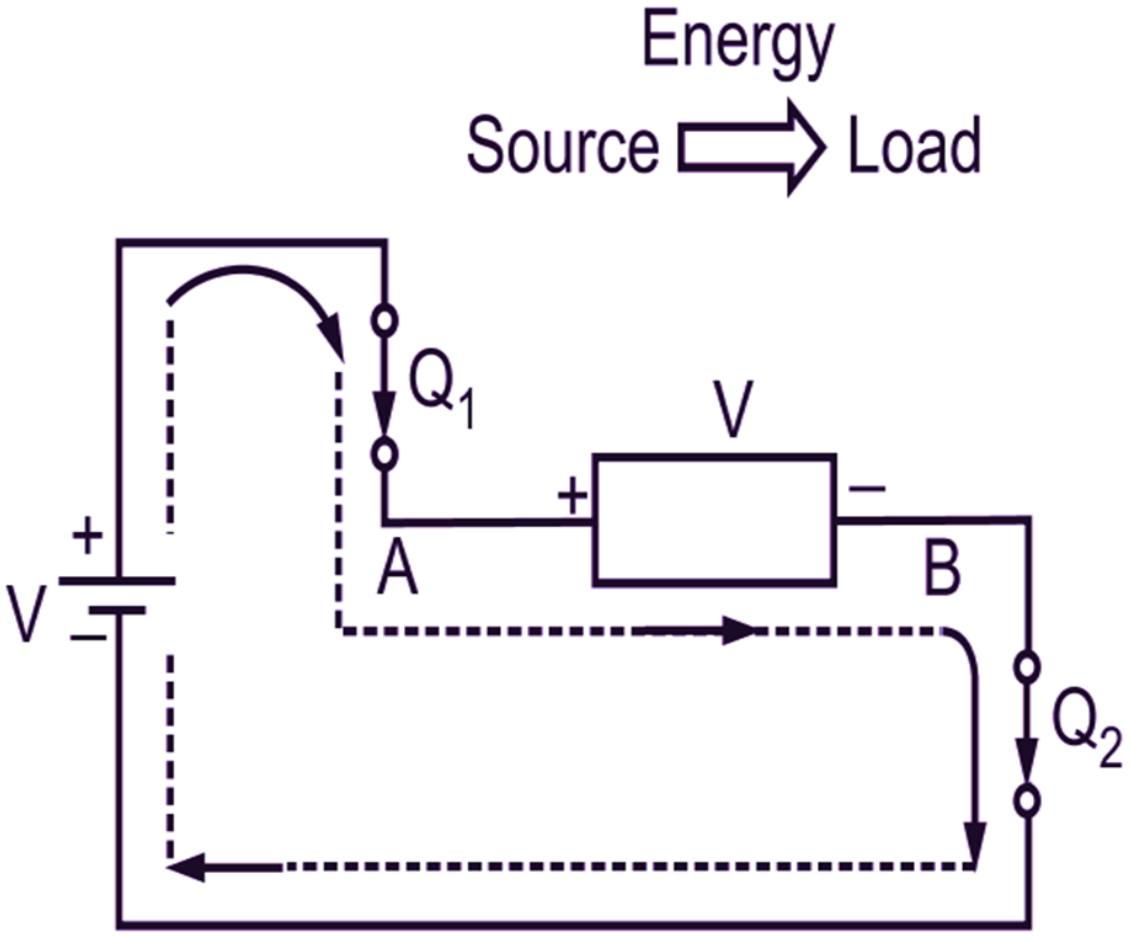

Fig. 33: Mode I

Interval 1 ($T_0/2 - T_0$) [Mode -2]:

During this time interval, the transistors Q_3 and Q_4 are turned ON at a time, $t = T_0/2$ while Q_1 and Q_2 are turned OFF at the same time (Fig. 4). The load voltage appeared the resistive load is -V volts and the direction (flow) of current is from B to A. Due to the resistive load, the energy is not stored feedback diodes do not come into the picture here.

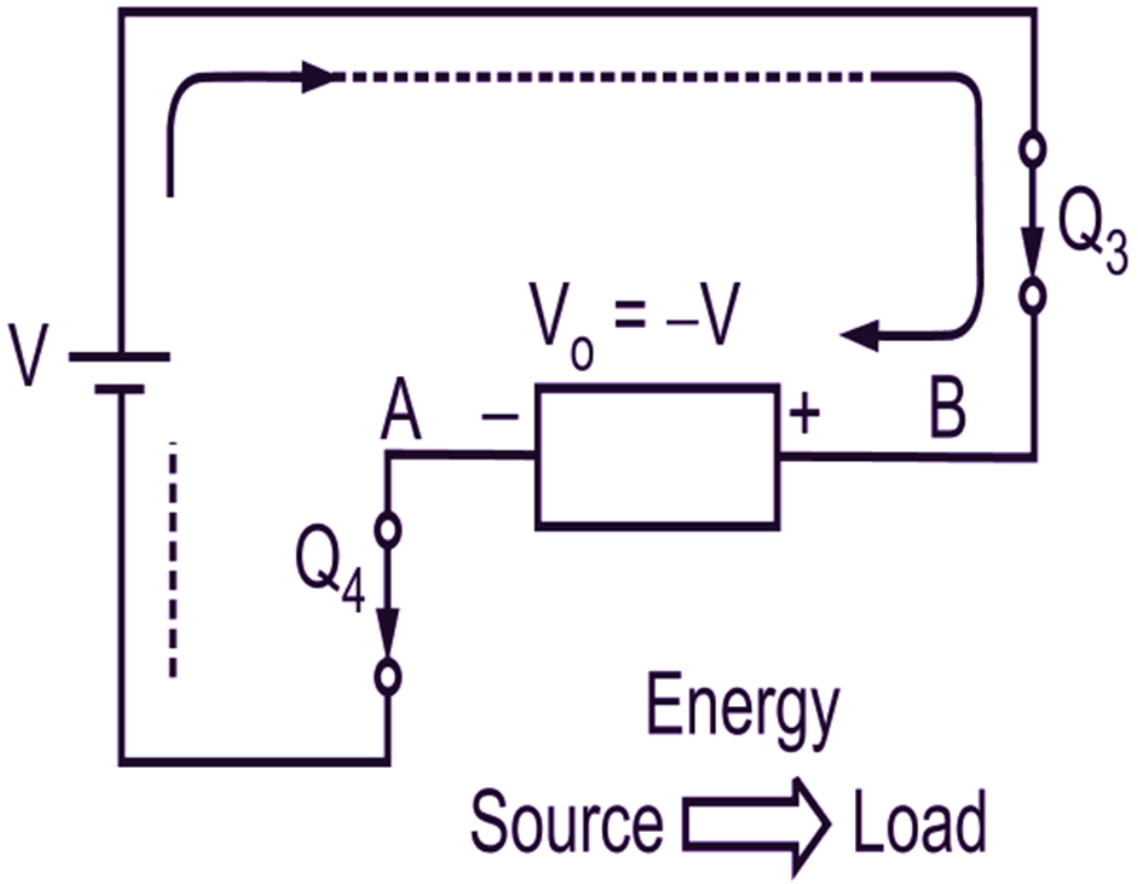

Fig. 4: Mode Il equivalent

Note:

The load current and load voltage are in phase with each other. The conduction period of the transistors is 180°.

Maximum value of current through each transistor is,

$$I_{max} = \frac{V}{R}$$

Average value of current through each transistor is,

$$I_{avg} = \frac{V}{2R}$$

The maximum value of forward voltage across transistor is,

$$V_{max} = V$$