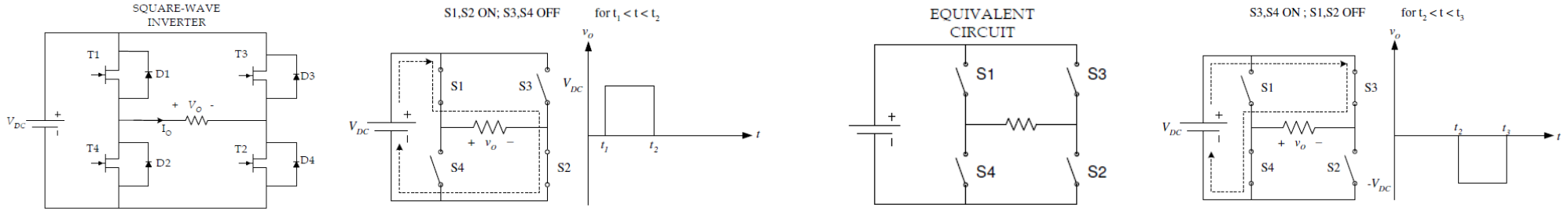
Power Supplies and Converters - 4a

STUDY FOR FE

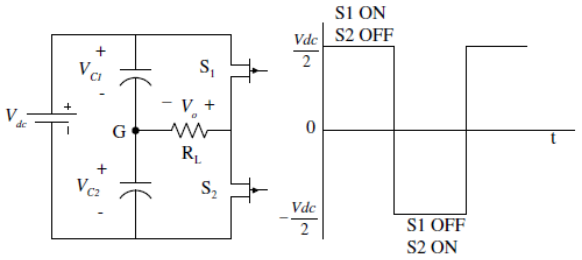
DC-AC converter (inverter) is an electrical device that converts DC input voltage into desired AC output voltage.

Square-wave Inverter

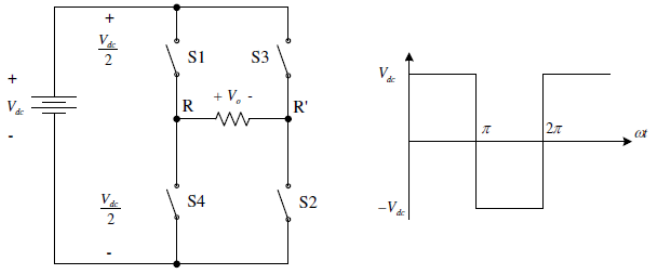


Single-phase, half-bridge Inverter

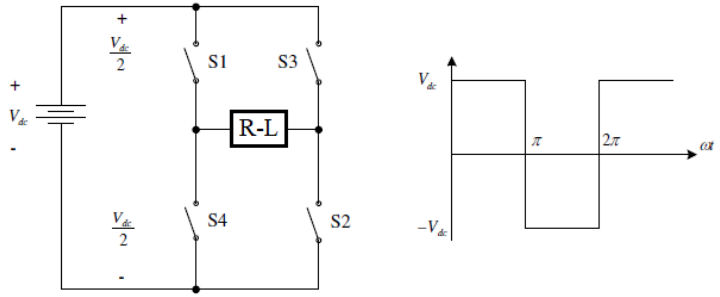
Inverter

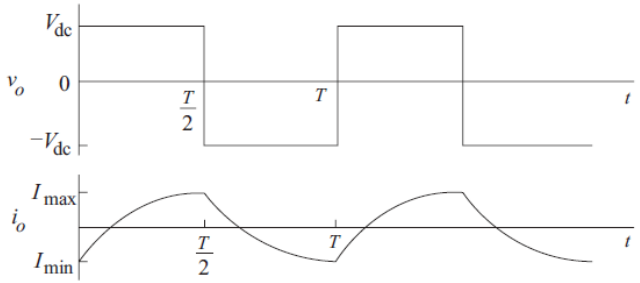


Single-phase, full-bridge



Single-phase, full-bridge Inverter with R-L load





$$i_o(t) = \begin{cases} \frac{V_{dc}}{R} + \left(I_{min} - \frac{V_{dc}}{R}\right)e^{-t/\tau} & \text{for } 0 < t < \frac{T}{2} \\ \frac{-V_{dc}}{R} + \left(I_{max} + \frac{V_{dc}}{R}\right)e^{(t-T/2)/\tau} & \text{for } \frac{T}{2} < t < T \end{cases}$$

$$I_{max} = -I_{min} = \frac{V_{dc}}{R}\left[\frac{1 - e^{-T/2\tau}}{1 + e^{-T/2\tau}}\right]$$

$$I_{rms} = \sqrt{\frac{1}{T}\int_0^T i^2(t)d(t)} = \sqrt{\frac{2}{T}\int_0^{T/2}\left[\frac{V_{dc}}{R} + \left(I_{min} - \frac{V_{dc}}{R}\right)e^{-t/\tau}\right]^2 dt}$$