# SNS COLLEGE OF TECHNOLOGY

**Coimbatore-35**
**An Autonomous Institution**

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## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

**19EET301 / POWER ELECTRONICS AND DRIVES**

**V SEM EEE**

UNIT 3 –AC CONVERTERS

# SINGLE PHASE INVERTER

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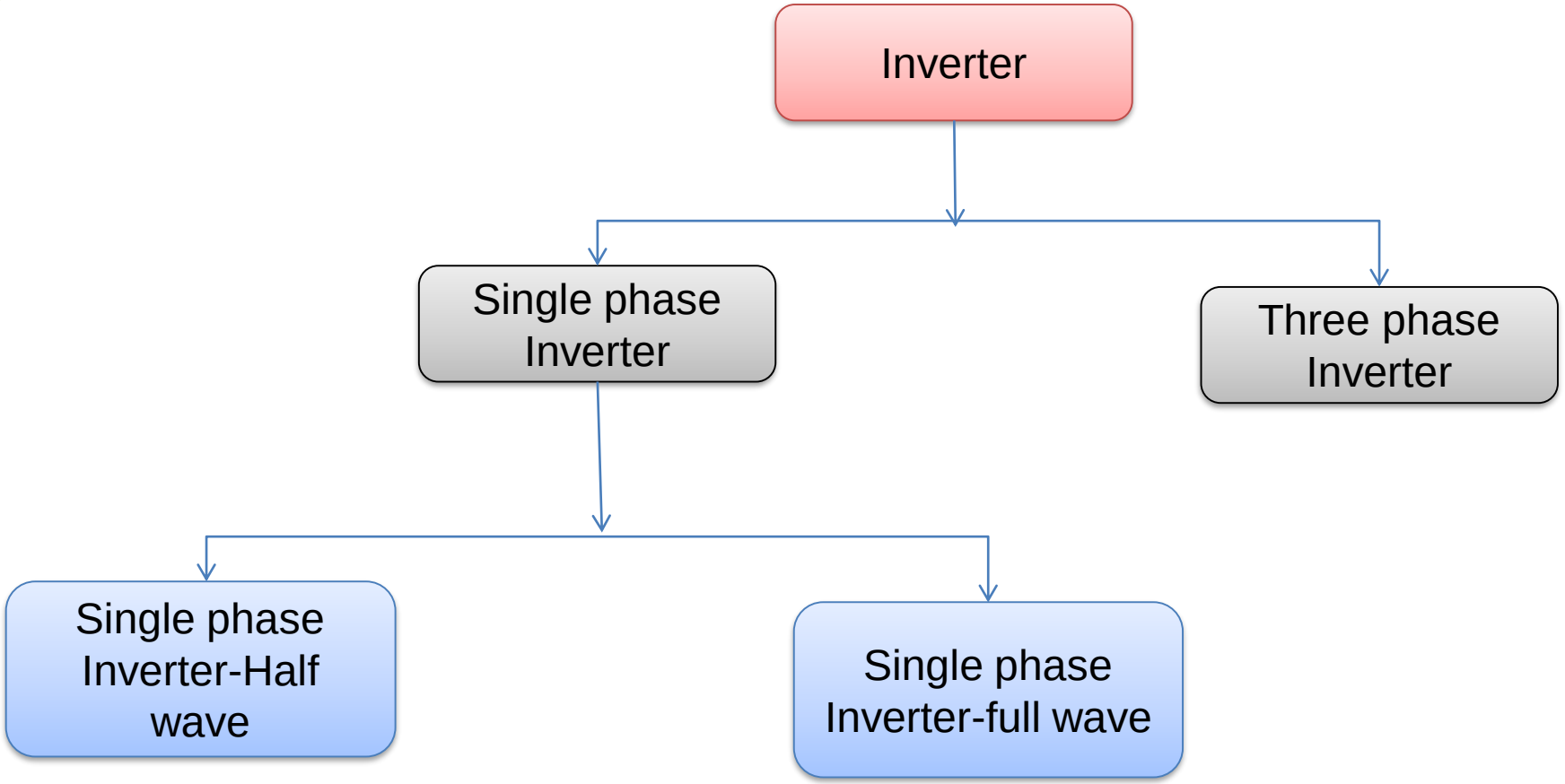
# APPLICATION

## Intro-Inverter

Inverter is defined as an Electrical device which converts the Direct current source into the Alternating current source.

The main source of electrical power is the battery which is a DC source. The DC output of the battery is bucked or boosted according to the requirement and then converted into AC using a DC-AC inverter.

## Types of inverter-



Inverter is a device which converts DC to AC power at desired output voltage and frequency.

**Classification based on Nature of source:**
Voltage Fed Inverter (VFI or VSI) and Current Fed Inverter (CFI or CSI).

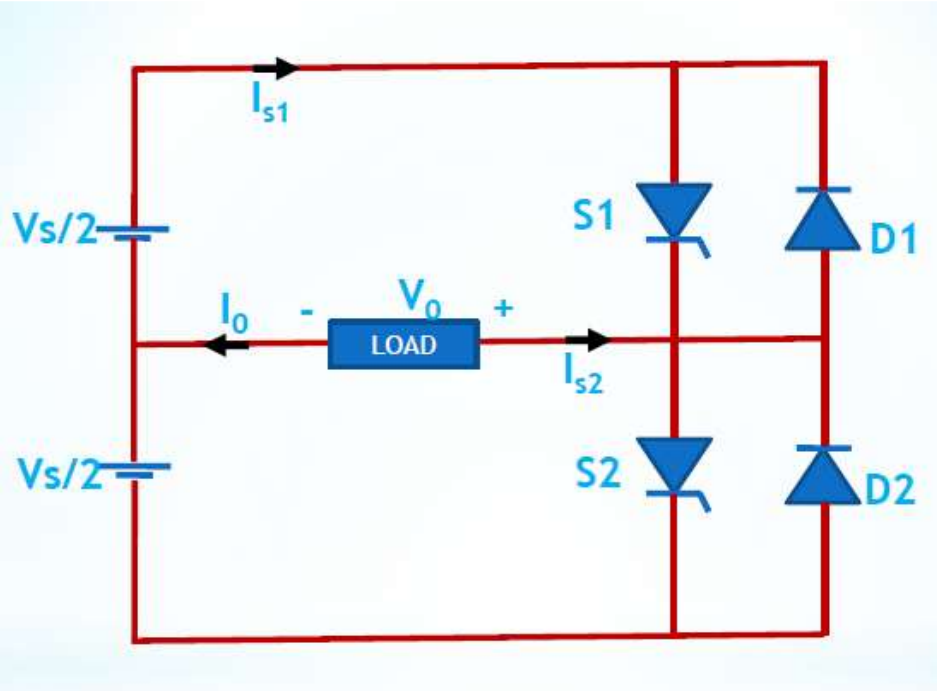
**VSI** - negligibly small source impedance so terminal voltage remains substantially constant for variations in load.
Short circuit causes current to rise instantaneously due to less time constant and current should be interrupted by Fast Acting Fuses.

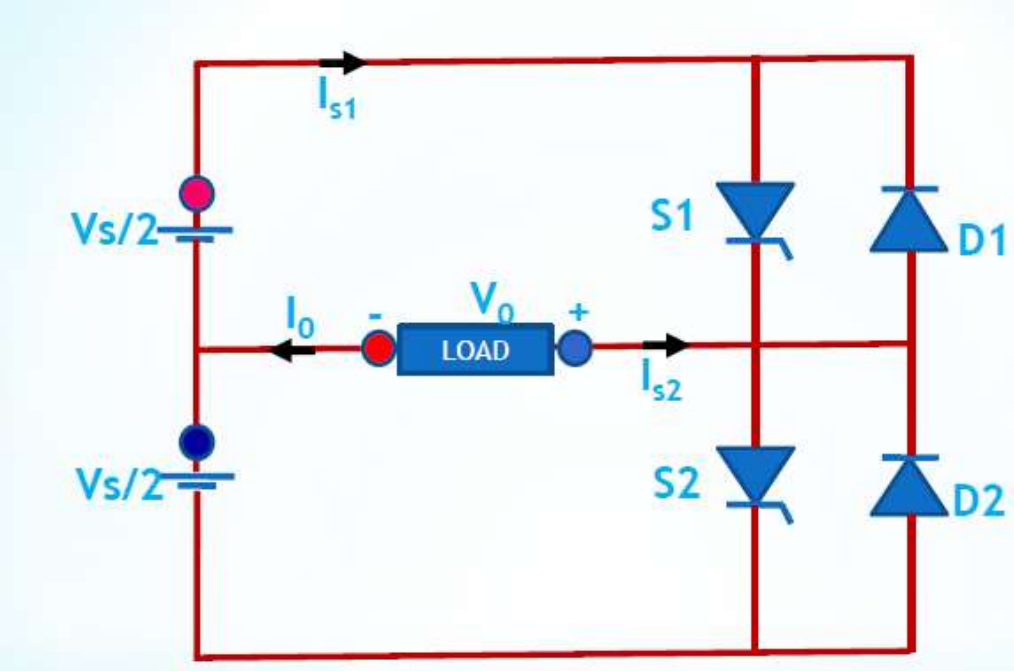
**CSI** - supplies with controlled current from a DC source with large impedance.
Typically a rectifier feeds the inverter with a regulated current through large series inductor.

**Classification based on wave shape of output:**

- Square wave inverter
- Quasi Square wave inverter
- Pulse Width Modulated inverter

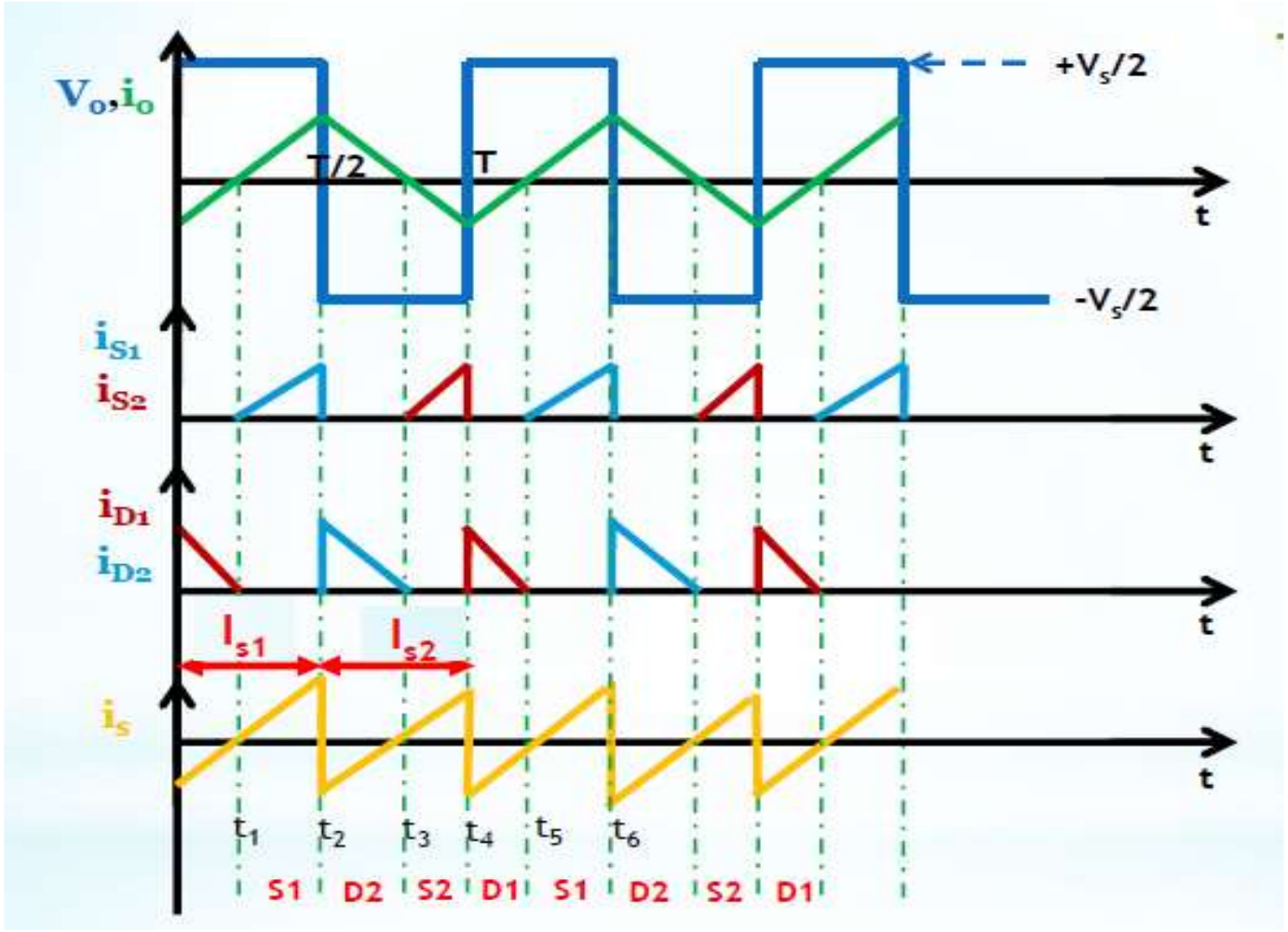
# 1-ph Half Bridge Inverter



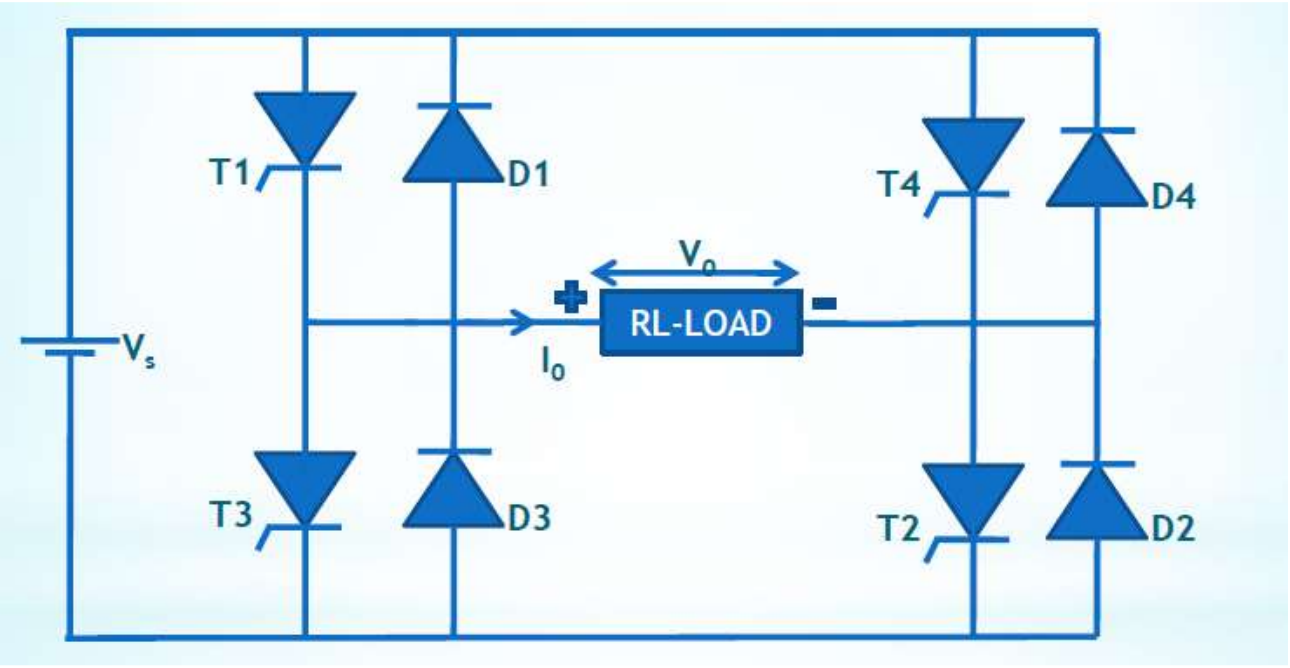

Mode1: S1-ON, Vo is +ve, Io is +ve, Is1 is +ve. Load takes power from source; VT2=Vs, VD1=0V, VD2= -Vs.
Mode 2: S1-OFF, D2ON;Vo is -ve, Io is +ve, Is2 is –ve; Load delivers power to source,VT1=Vs, VT2=0V, VD1=-Vs.
Mode 3: S2-ON, Vo is -ve, Io is -ve, Is2 is +ve. Load takes power from source;VT1=Vs, VD1= -Vs, VD2=0V.
Mode 4: S2-OFF, D1 ON;Vo is +ve, Io is -ve, Is1 is –ve; Load delivers power to source,VT1=0V, VT2=Vs, VD2=-Vs.

# 1-ph Half Bridge Inverter-Waveforms




$$V_o(rms) = \frac{1}{T_0/2}\int_0^{T_0/2}\frac{V_S^2}{4}\,dt = \frac{V_S}{2}$$

# 1-ph Full Bridge Inverter-Schematic



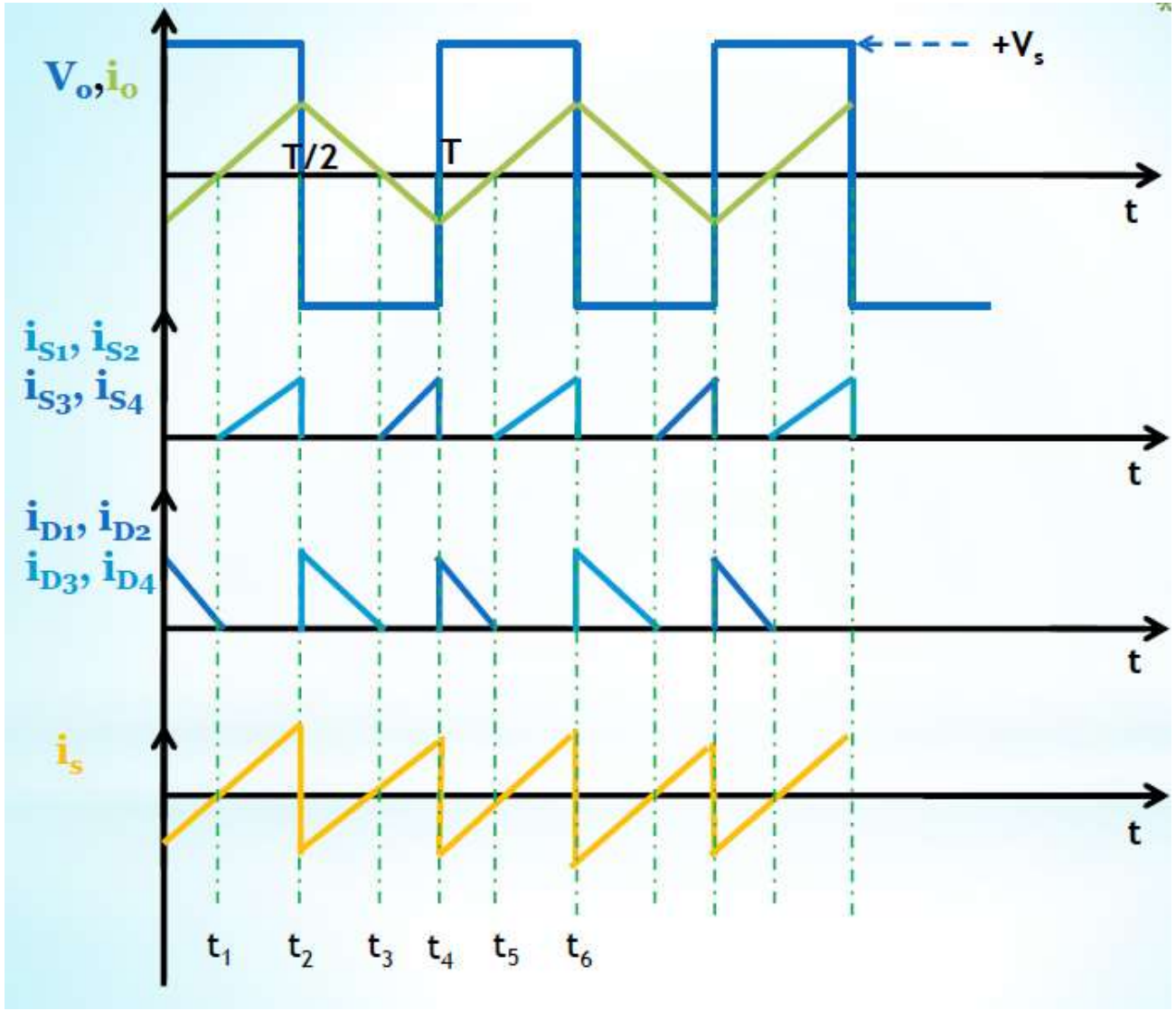

**MODE 1**: T1, T2 ON, SOURCE DELIVERING POWER TO LOAD – Vo +ve, Io +ve.

**MODE 2**: FREE WHEELING INTERVAL, LOAD DELIVERING POWER TO SOURCE
THROUGH D3, D4 – Vo –ve, Io +ve.

**MODE 3**: T3, T4 ON, SOURCE DELIVERING POWER TO LOAD, Vo –ve, Io –ve.

**MODE 4**: FREE WHEELING INTERVAL, LOAD DELIVERING POWER TO SOURCE
THROUGH D1, D2 – Vo +ve, Io –ve.

# 1-ph Full Bridge Inverter- Wave forms

The rms output voltage is

$$V_0=\left(\frac{2}{T_0}\int_0^{T/2} V_S^2\right)^{1/2}=V_S$$