Daffodil International University
Department of Electrical & Electronic Engineering
Course Code: EEE 450
Course Title: Power Plant Engineering Lab.

Lab Experiment 01: Designing of off-line residential solar power system using MATLAB-SIMULINK software.

Objective: To familiarize with the design mechanism of off-line residential solar power system using MATLAB-SIMULINK software.

Theory:
The solar cell consists of semiconductor material which using the photovoltaic effect. Normally, a single solar cell cannot be connected directly to the load because it has low energy conversion efficiency and low output voltage. Moreover, the output voltage depends to the solar radiation and temperature as well.

The boost converter will step up the solar panel voltage to the suitable voltage required by electronic equipment. For AC electrical equipment, the system requires an additional DC/AC inverter which converts the constant DC voltage to AC voltage and power produced by solar panel is directly delivered to the load.
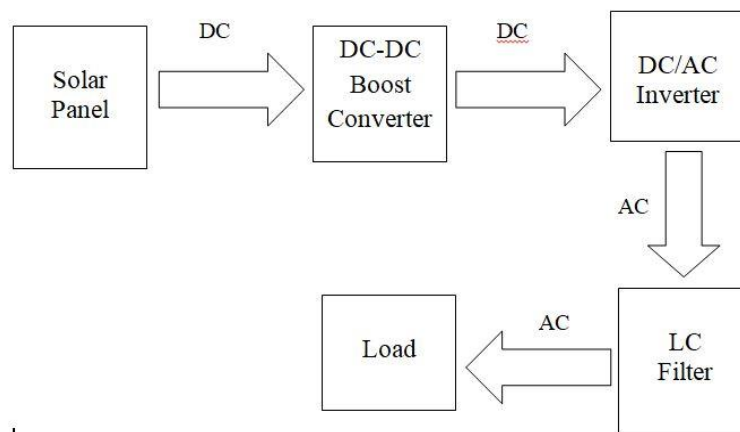

Fig: Overall Simplified Block Diagram of System.

Boost Converter:
Boost converters are used to obtained higher output voltage in comparison with the input DC voltage and it is increasingly employed as front end converters for battery sources,

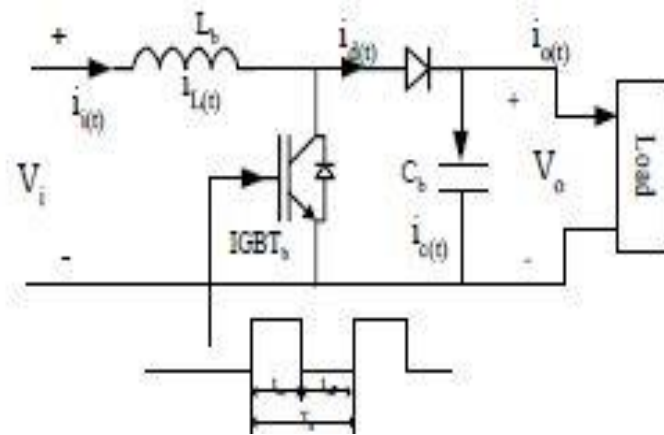photovoltaic solar systems and fuel cells. Graphically model of boost converter using IGBT is shown in figure.

Fig. Circuit Schematics of DC-DC Boost Converter

Single Phase Voltage Source Inverter
Single phase inverters are basic inverters which produce a square shape AC output with a DC input. These inverters have simple on-off control logic and obviously they operate at much lower frequencies. Due to a capacity of low power, they are widely used in power supplies and single phase UPS.
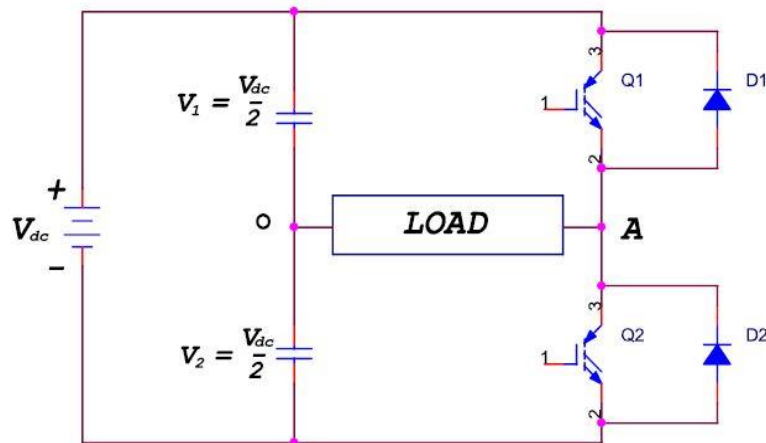

Fig. Circuit Topology of Half Bridge Inverter

Question:
   1. What is the importance of designing boost converter for residential PV system?
   2. For Grid-connected solar system which type of inverter need to implement?