

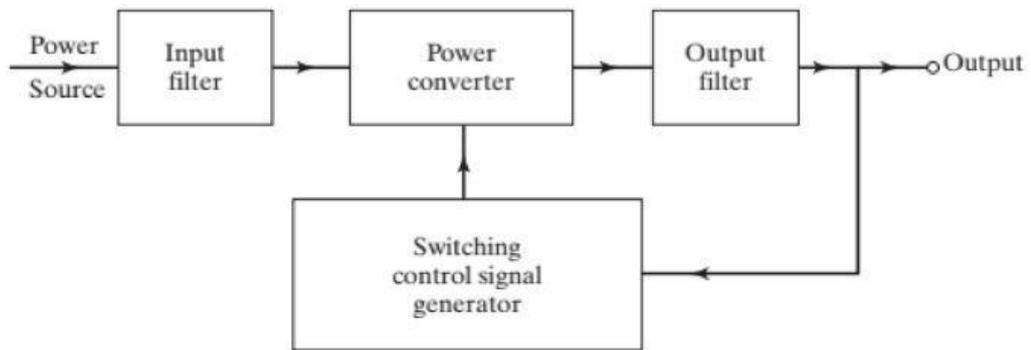
1. Give the definition of Power Electronics

Answer :

Power electronics may be defined as the application of *solid-state electronics for the control and conversion of electric power.*

2. Complete the block diagram for a power electronic system

Answer :

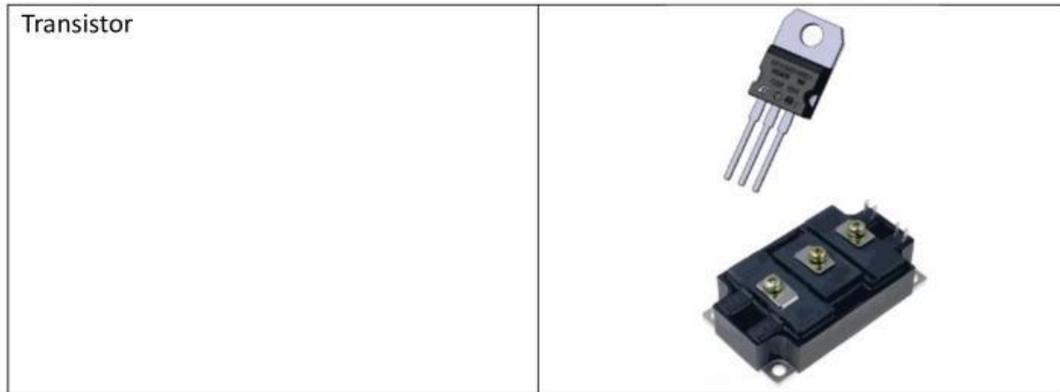


Generic structure of a power electronic system

3. Match the figure of power electronic devices

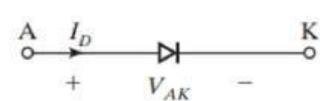
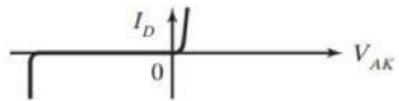
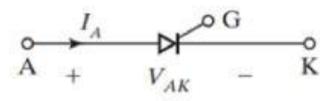
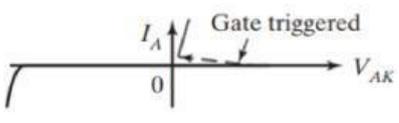
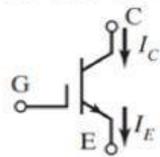
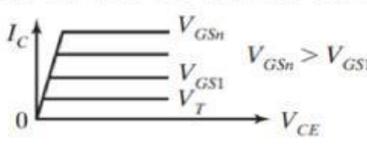
Answer :

Components	Figure
general-purpose diode	
Thyristor	



4. Select the correct Characteristics of the power electronic devices

Answer :

Devices	Symbols	Characteristics
Diode		
Thyristor		
IGBT		

5. Complete the table of the **power losses** in a power electronic system

Answer:

Type of Loss	Description	Example
Conduction Losses	The power dissipated when the switching device is in the "ON-state" (conducting) due to a small, non-zero voltage drop across the component.	Power loss across the drain and source of a MOSFET due to its on-state resistance ($R_{DS(on)}$).
Switching Losses	The power dissipated during the transition period when the device moves between the "ON" and "OFF" states, where both high voltage and high current exist simultaneously.	Energy lost during the turn-on and turn-off transients of an IGBT (or MOSFET), which is proportional to the switching frequency.
Gate Drive Losses	The power required by the control circuit (gate driver) to repeatedly charge and discharge the input capacitance of the switching device to turn it on and off.	Loss due to charging and discharging the gate capacitance (C_{GS} or C_{GE}) of a power MOSFET or IGBT using a driver circuit.
Snubber Losses	Power dissipated in the circuits (usually containing resistors, capacitors, and/or diodes) that are added to the power device to shape the voltage or current waveforms during switching transitions.	Energy is lost in the resistor component of an RCD snubber circuit as it dissipates the energy stored in the capacitor after each switching cycle.