

EXPERIMENT 4

OBJECTIVE: To design and implement half bridge and full bridge controlled rectifier using single-phase SCR bridge modules with series RL and parallel RC loads.

EQUIPMENT:

- i. Half Bridge Controlled Rectifier Module.(powercon make).
- ii. External gate drive pulses for two SCR's in proper sequence must.

THEORY:

SCR is a four layer P-N-P-N device whose various terminals are marked as Anode (A), Cathode (K) and Gate (G). SCR is unidirectional device. It can be made to conduct in forward direction by applying positive voltage between anode-cathode terminals and making gate terminal positive with respect to cathode terminal. There is some maximum forward blocking voltage V_{BO} , above which the SCR break-down and starts conducting in forward direction without need for any gate current. SCR also breakdowns in reverse direction when a certain maximum reverse voltage is exceeded, this voltage is called V_{BR} . This reverse breakdown is destructive and hence should not be tried.

For operating SCR's as switches, an appropriate gate voltage or base current must be applied to drive the devices into saturation mode for low on state voltage. The control voltage should be applied between the gate and cathode terminals. The power converters generally required multiple SCR's and each SCR must be gated individually.

Applications of controlled rectifiers, such as constant voltage supply, battery charges, electroplating rectifiers and speed controllers. For lower power applications, single phase circuits are generally used, whereas three phase versions are used where high power is involved. Since SCR's are available in a variety of power ratings, their application in high power control, in order of megawatts, is gaining ground. It is also making its mark in the field of high voltage dc transmission.

ABOUT THE KIT:

The unit consists of two SCR's in half bridge fashion (as shown in figure). The SCR used in this unit are of high voltage and high current ampere ratings. Here, we have given the MCB for on/off, facility for connecting the gate pulses and facility for seeing input and output.

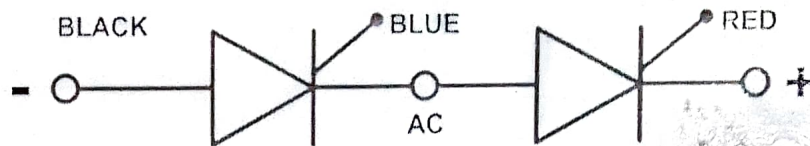


Figure 1

NOTE: See that wires are connected to load are off that much current rather

PROCEDURE:

1. Please refer to front panel of circuit diagram.
2. Connect the GK pulses externally in proper sequence to G1K1 and G2K2.
3. Put the mains to off position and connect the line wire to "BLUE" terminal and connect neutral to point of load.
4. Switch on the mains and put the MCB to on position.

FOR +VE OUTPUT

5. Connect another point of load to "RED" terminal for getting the positive half cycle.(Refer figure 2)

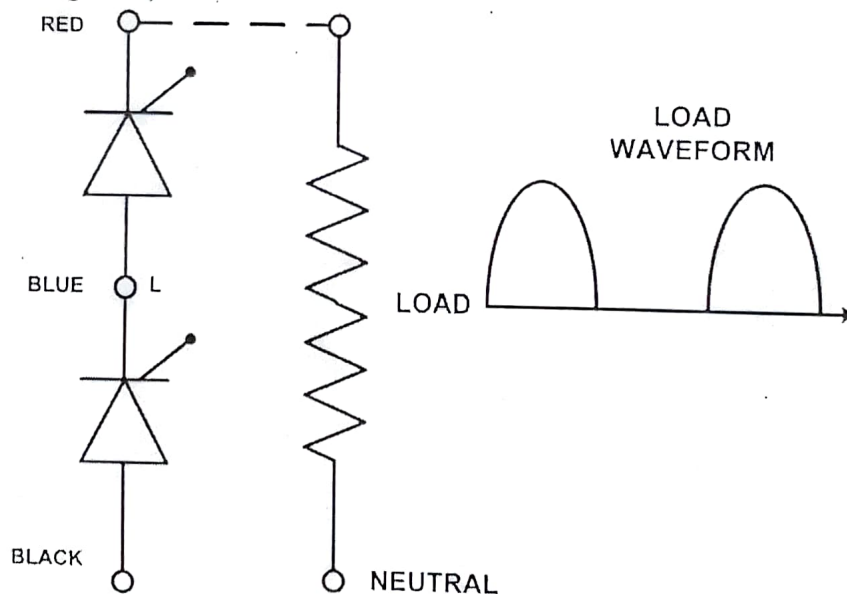


Figure 2

FOR -VE OUTPUT

6. Connect another point of load to "BLACK" terminal for getting the negative half cycle.(Refer figure 3)

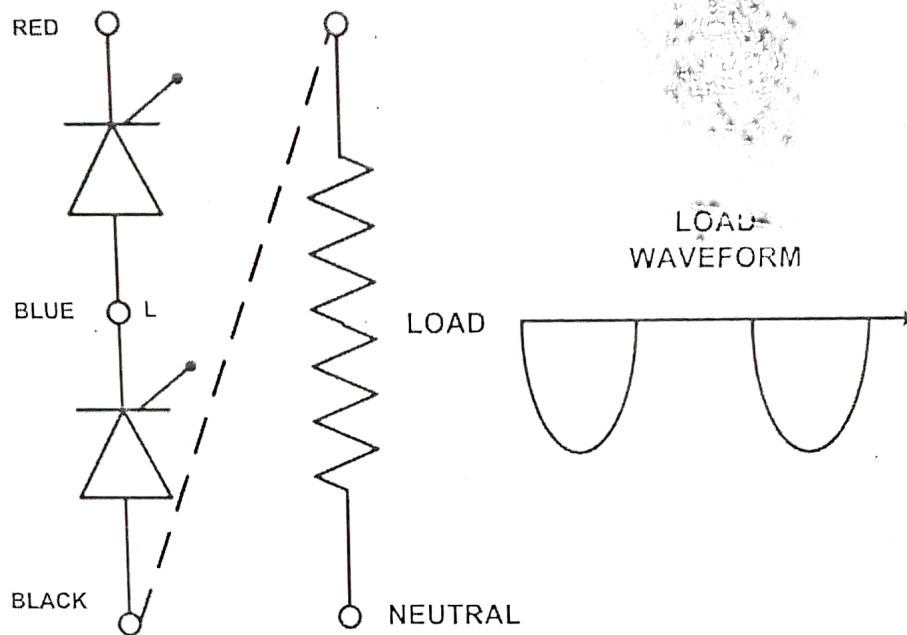


Figure 3

Here, we can build one full bridge rectifier module using two unit of half bridge controlled module as shown in circuit below

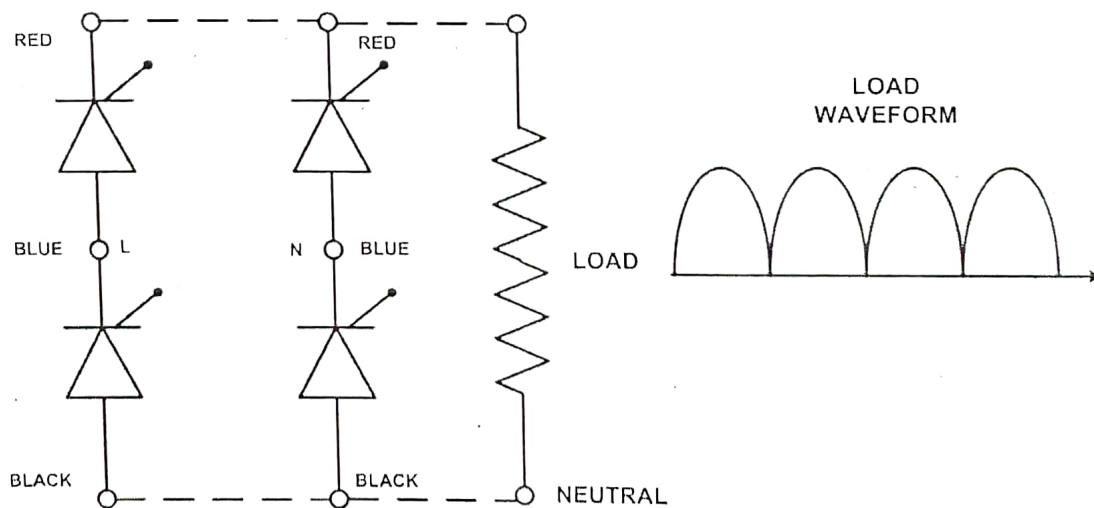


Figure 4

NOTE- Here, we have to give the gate pulses in proper sequence which can drive full controlled rectifier.