EXPERIMENT 6

OBJECT:- To implement the gate drive for IGBT bridge module as an inverter and study its characteristics.

APPARATUS REQUIRED:-

1. IGBT BRIDGE MODULE
2. C.R.O. with probes.

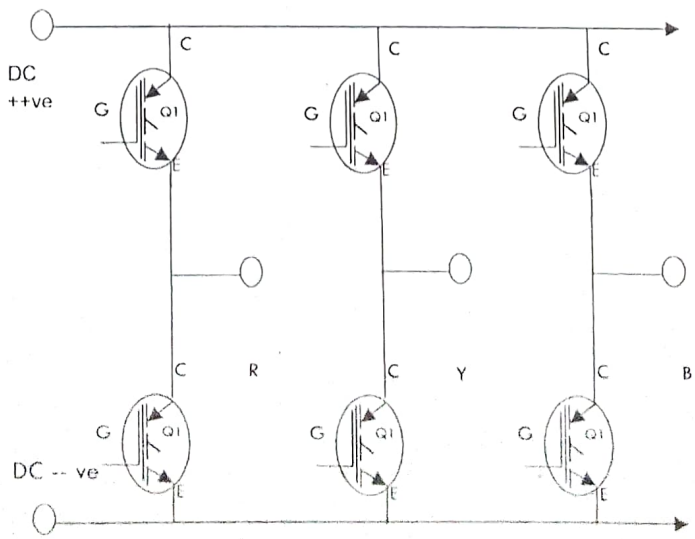
THEORY:-

For operating IGBTs as switches, an appropriate gate voltage must be applied to drive the transistors into saturation mode for low on state voltage. The control voltage should be applied between the gate and emitter terminals. The power converters generally require multiple transistors and each IGBT must be gated individually.

An IGBT combines the advantage of BJTs & MOSFETs. An IGBT has high input impedance, like MOSFETs and low on state conduction losses, like BJTs. But there is no second breakdown problem, like BJTs. An IGBT is voltage controlled device similar to POWER IGBT. It has lower switching & conducting losses while sharing many of the appealing features of power MOSFETs such as ease of GATE drive, peak current capability, and ruggedness. An IGBT is inherently faster than BJT. Three terminals are Gate, Collector & Emitter. The current rating of a IGBT can be up to 400 A, 1200 V, and the switching frequency can be up to 20 kHz. IGBTs are finding increasing application in dc & ac motor drives, power supplies solid-state relays & contractors.

The controlling parameter is input voltage , the Gate-Emitter voltage, rather than an input current. The transfer curve *IC - VGE* is identical to that of the power IGBT. the curve is linear over most of the Collector current range, becoming nonlinear only at low Collector currents where Gate-Emitter voltage is approaching the threshold. If VGE is less than the threshold voltage VT then the IGBT is in off state. The maximum voltage that should be applied to the Gate Emitter terminals is usually limited by the maximum Collector current that should be permitted to flow in the IGBT.

CIRCUIT DIAGRAM:-



The unit consists of 6 IGBT in bridge format. As this is only bridge module. we have to give external DC supply. And also we have to give external gate pulses to these IGBTs in proper sequence. A separate connector for external gate pulses has been given with this unit.

A snubber card also has given for protection of IGBTs. A snubber consists a resistor and a capacitor in series across drain and source to avoid misfiring of IGBTs.

PROCEDURE:-

1. Please refer to front panel for circuit diagram.
2. Put mains switch to OFF position and connect DC i/p supply to the unit (300 / 500 V DC).
3. Connect the gate pulses externally in proper sequence.
4. Connect DC +ve to T4
5. Connect the DC -ve To T5
6. Connect the load across o/p. Connect the lamp load in star connection at T1, T2, and T3 with star N.
7. Switch On power to unit.
8. Observe o/p voltage waveform across T1 w.r.t. T2. OR T2 w.r.t T3 OR T3 w.r.t T1 on C.R.O. and note down o/p voltage (it will phase to phase o/p.)
9. Switch OFF supply of unit.

CAUTION :-

1. Connect proper sequence of 3 phase supply to the Converter unit.
2. Use unearthed CRO while observing waveforms of high output voltage. For low output voltage there is no need of unearthed CRO.

OBSERVATION TABLE:-

S.NO.	DC VOLTAGE I/P (V)	AC O/P VOLTAGE PH-PH (V)
1.		
2.		
3.		
4.		

CONCLUSION:-