MODEL TEST PAPER
SUB CODE EE301 / EL 305
EE - III year

Q:1 : SCR & TRIAC are respectively

(A) Both are unidirectional

(B) Both are bidirectional

(C) SCR is unidirectional & TRIAC are bidirectional

(D) SCR is bidirectional & TRIAC is unidirectional

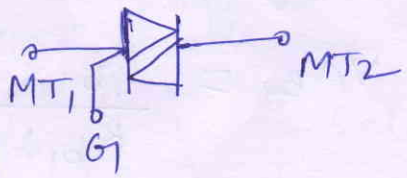
[C]

Q:2 : What is holding current & Latching current?

→ Holding current :- minimum value of current that must be there to provide a path between anode & cathode to flow anode current to maintain SCR in on state. Below holding current SCR will be off.

Latching current :- min Anode current required to maintain a thyristor in on state immediately after SCR is triggered on. Its value is greater than latching current.

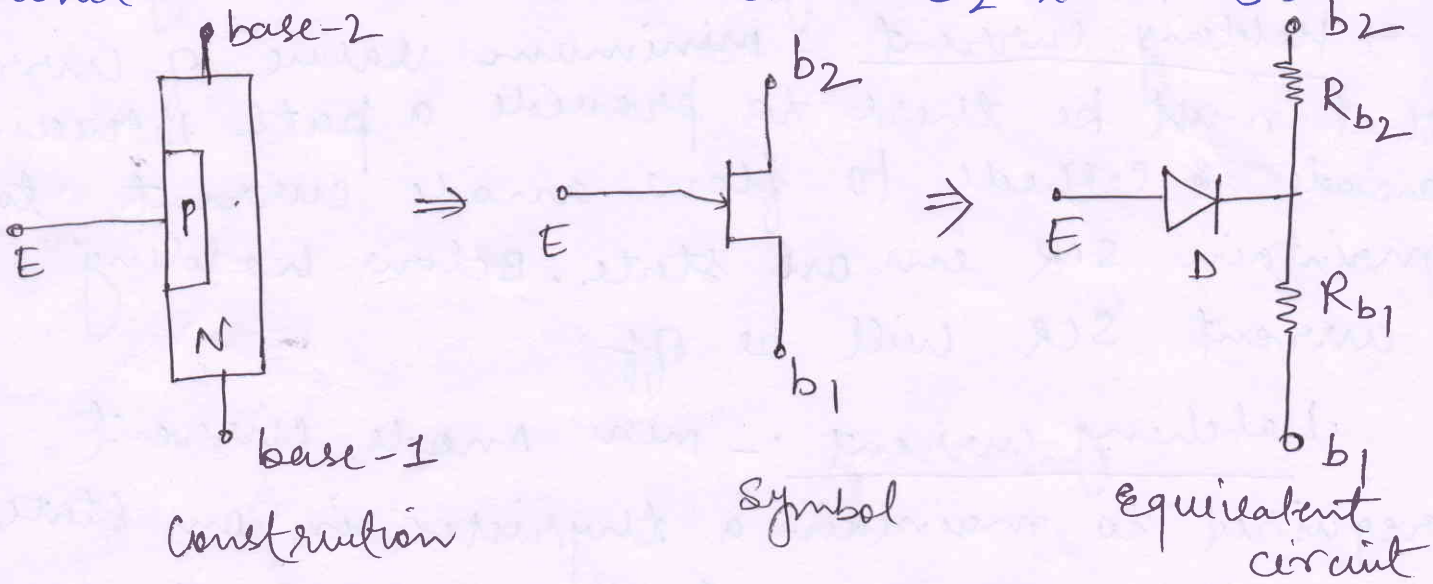
Q:3 What is the difference between ~~DT~~ SCR & TRIAC?

SCR	TRIAC
① symbol 	symbol 
2) Available in Large rating	Available in Smaller rating

3) SCR can be triggered by positive gate volt only.	Triac can be triggered either by positive or negative gate voltage
4) It control DC power	Control DC as well as AC power.

Q.3: Explain UJT construction, operation & application?

Ans:- UJT refers to unijunction transistor. It has 3 terminals emitter & two bases. i.e. E, B_1, B_2. The base is formed by a lightly doped n-type bar of silicon. Emitter is of p-type heavily doped. Junction. Emitter is closer to B_2 than B_1.



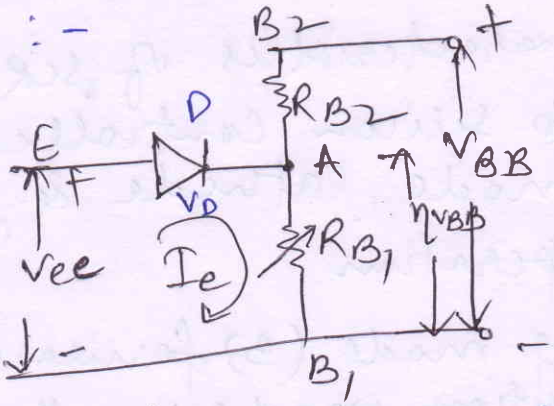
It is called unijunction transistor because there is single junction formed by embedding in of n-type Si base & p-type emitter.

When a volt V_{BB} is applied across the two base terminals B_1 & B_2; potential of point A w.r.t B_1 is given by

$$V_{AB_1} = \frac{R_{b_1}}{R_{b_1}+R_{b_2}} \cdot V_{BB} = \eta \cdot V_{BB}$$

$\eta = \frac{R_{b_1}}{R_{b_1}+R_{b_2}}$ → Intrinsic Stand off ratio → 0.5 – 0.8

UJT operation :-



When volt V_{BB} is applied between base b_1 & b_2 Than volt $V_A = \eta V_{BB}$ & this volt acts as RB on diode D. if $V_{EE} < V_A$ there is no current flow in emitter due to Reverse biasing of diode.

if $V_{EE} \geq \eta V_{BB} + V_D$ than current flow through diode D.

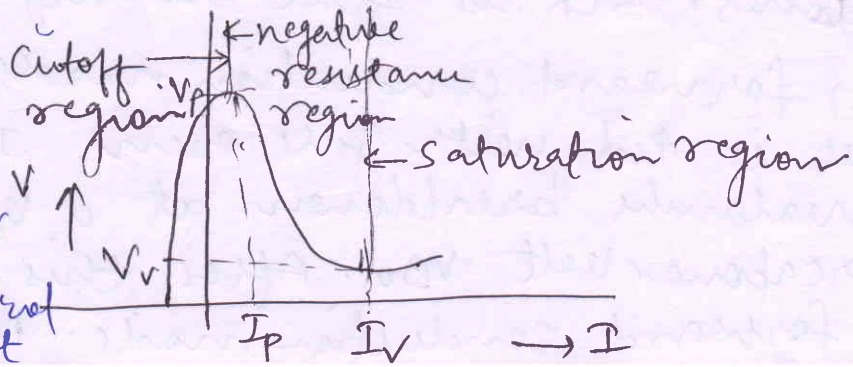
There are 3 regions in UJT

1. Cutoff region – No current flow in emitter circuit and UJT is off in this state.
2. Negative resistance region – emitter volt is decreased to valley point volt and emitter current is increased. Due to flow of current in b_1, no of e^- is increased so resistance R_{B_1} is decreased. Since R_{B_1} Dec with volt ↑ hence it is called negative resistance region. Flow of current into UJT emitter causes resistive value of R_{B_1} to Dec, allowing more current flow.
3. Saturation Region :- Increasing VEE keeps emitter voltage constant but emitter current increases

Application :-

(1) used as a relaxation oscillator

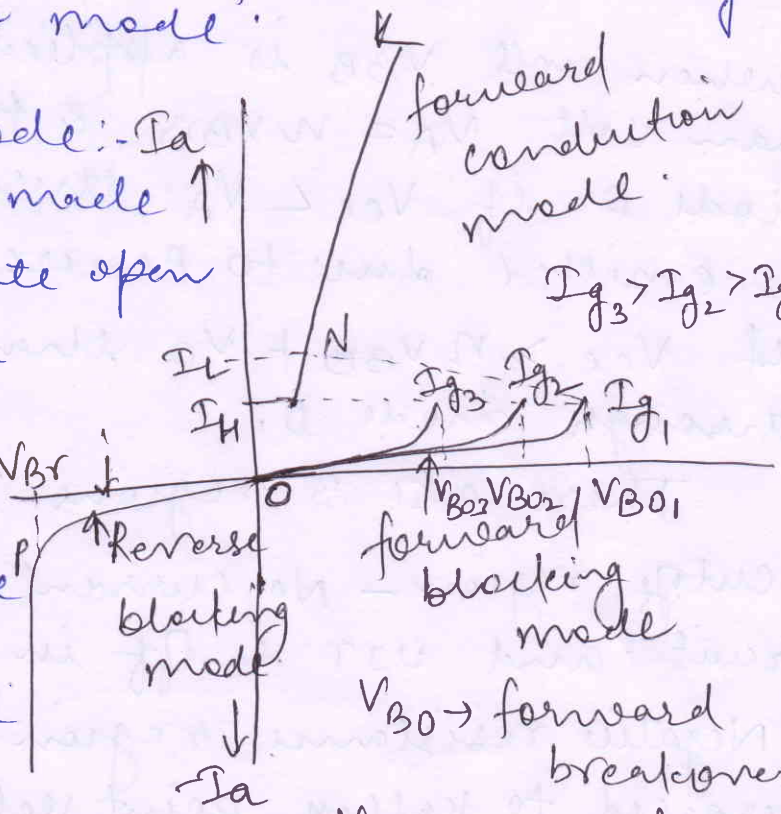
(2) used in phase control circuit



3:4 Explain V-I characteristics of SCR with graph?

Ans:- SCR refers to Silicon Controlled rectifier. It has 3 terminals Anode, Cathode & gate. It has 3 basic modes of operation

(A) Reverse Blocking mode (B) forward blocking mode (C) forward conduction mode.



(A) Reverse blocking mode:- Ia

When cathode is made ↑ +ve W.r.t Anode & gate open & SCR is Reverse biased and small current of few mA will flow. This is R.B mode of P. if reverse volt is fed to breakdown level V_{Br}, an avalanche breakdown occurs at J_1 & J_3. J_2 is forward biased. In this mode device offers high impedence state.

V_{BO} → forward breakover volt

V_{Br} → Reverse breakdown volt

I_g → gate current

(B) forward Blocking mode → when Anode is positive W.r.t cathode, & gate open. SCR is forward biased. J_1, J_3 is forward biased and J_2 is R.B in this mode small forward leakage current flows. SCR is still in high impedence state.

(C) forward conduction mode:- when A-K forward volt is fed with gate open, J_2 will have an avalanche breakdown at a volt called forward breakover volt V_{BO}. After this SCR entered into forward conduction mode. NK.