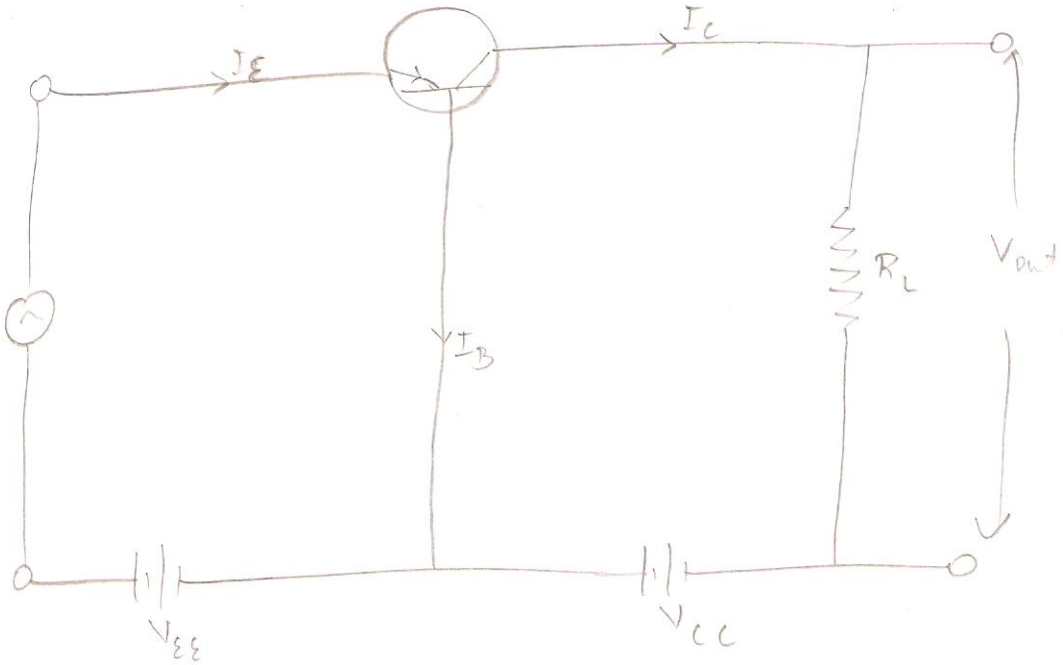
Que-7 (i) Transistor as an amplifier.
(ii) Transistor as an Oscillator.

Ans(i) Transistor as an amplifier:→



$$\alpha = \frac{\Delta I_C}{\Delta I_E}$$

$$\Delta I_C = \alpha \Delta I_E$$

$$\Delta V_o = R_L \times \Delta I_C$$

$$= R_L \times \alpha \Delta I_E$$

$$A = \frac{\Delta V_o}{\Delta V_i}$$

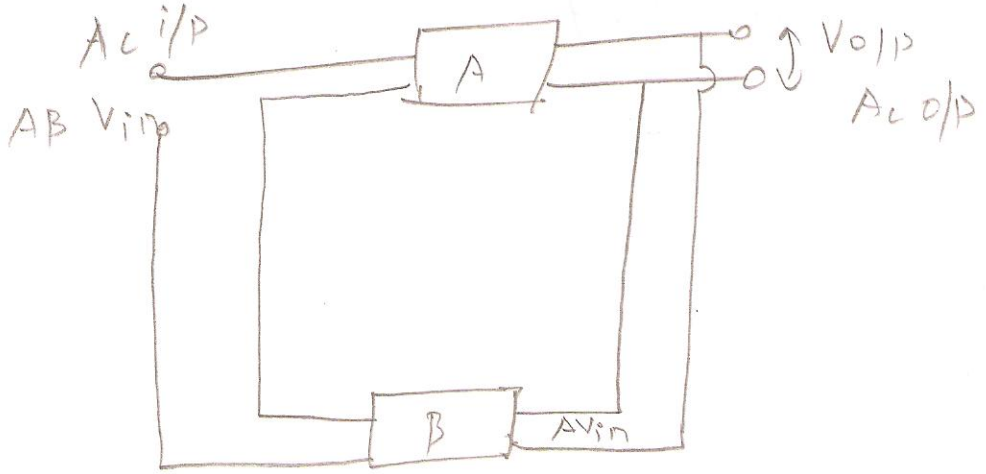
$$\Delta V_i = \gamma_e \Delta I_E$$

$$A = \frac{R_L \alpha \Delta I_E}{\gamma_e \Delta I_E} = \frac{\alpha R_L}{\gamma_e}$$

Emitter as I/p terminal & collector as o/p terminal transistor is ~~app~~ baised to operate in active region weak signal & applied b/w emitter base current & o/p is taken across R_L in Collector base circuit for faithfull ampli. V_{EE} is connected to i/p. Small change in i/p produces appriciable change in emitter I. As i/p circuit has no resistance. Change in I_E changes I_{CC} when

Ie flows through R_L a large voltage is developed.

(ii) Operation of Oscillator :→

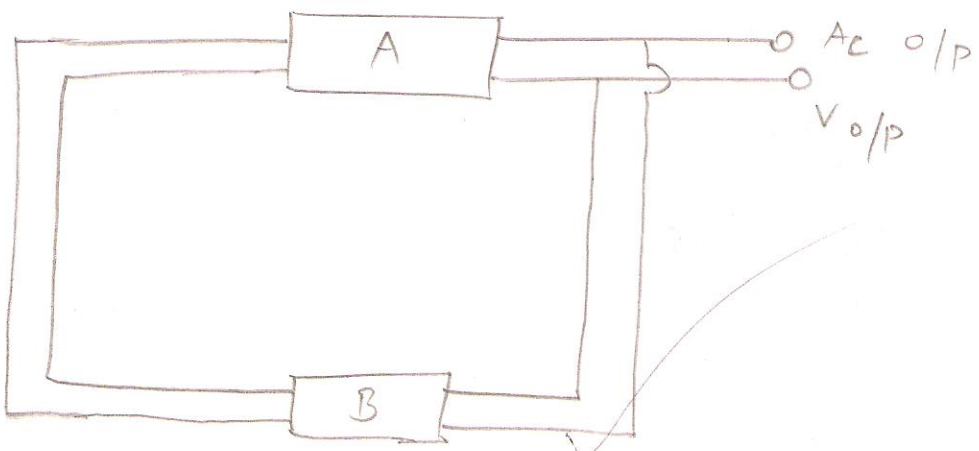


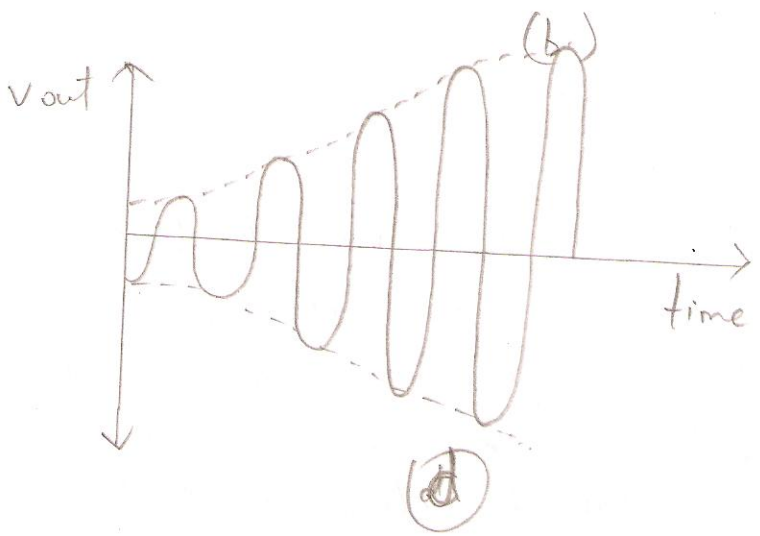
$V_f = A\beta V_{in}$

$A = \frac{V_{out}}{V_{in}}$

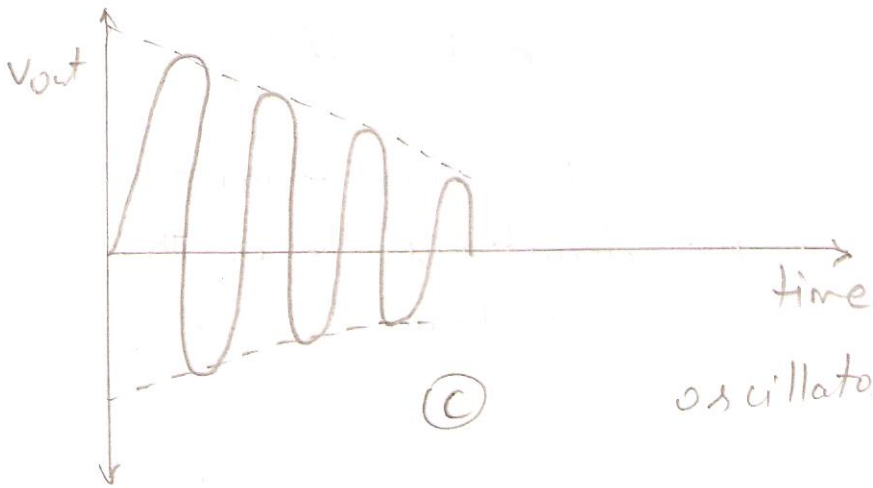
(a) $\beta = \frac{V_f}{A V_{in}}$

$V_f = \beta A V_{in}$

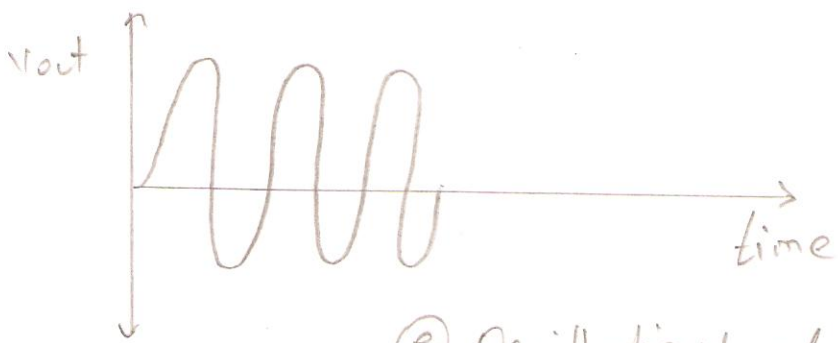




oscillator ~~die out~~ ~~built up~~ built up.



(c) oscillator die out



(e) Oscillations of Constant amplitude.

Use of +ve feedback is required in a oscillator that result in a feedback amplifier having close loop gain >1 in fig (a). A feedback circuit having V_{in} as the voltage of AC i/p driving i/p terminals V_c of an amplifier having volt. gain 'A'. $A_{out} = AV_{in}$. The voltage drives a feedback circuit that is a resonance circuit max. Feedback is at one freq. feedback voltage returning to point 'A' is given by eq' $V_f = AB V_{in}$ where B is the gain of feedback network. If the phase shift through amp^r & feedback circuit is zero than $AB V_{in}$ is in phase with the i/p signal V_{in} that drives the i/p terminals connecting a to b & simultaneously removing source voltage V_{in} than feedback voltage $AB V_{in}$ drives of an amp^r as in fig (B) If AB is less than unity. $AB V_{in}$ is less than V_{in}.

Then o/p signal will die out as in fig (c) As AB is greater than unity o/p will built up as

in fig (d). As $A\beta = 1$ then $A\beta V_{in} = V_{in}$ & o/p is the steady sine wave as in figure (e) to fulfill.

For sustained oscillation are o loop gain of the circuit must be equal to '1'. Phase shift around the circuit must be o. These two conditions are called back person Criteria.