GB depends only on Γ_L, not on Γ_S

GA depends only on Γ_S, not on Γ_L

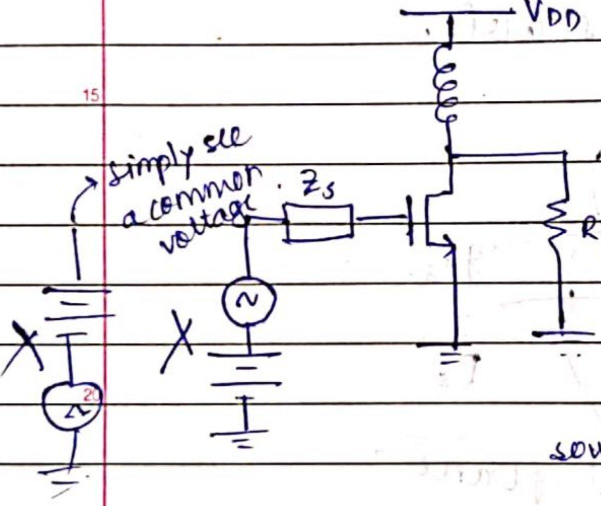
(All these operating & available power gains are for the bilateral case).

(gain ends)

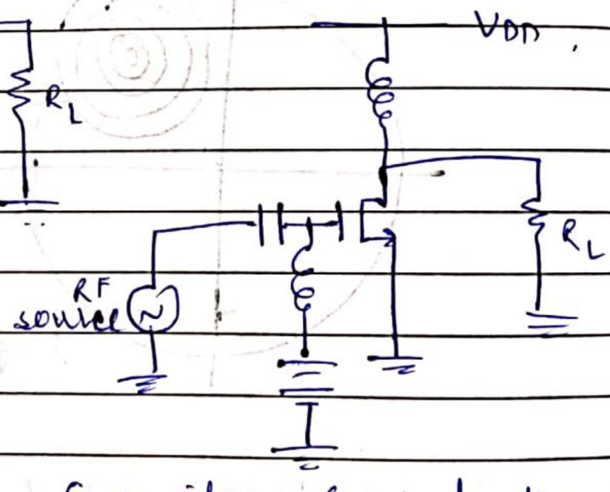
DC BIAS NETWORKS

P_{AVS} P_L

$G_T = \frac{P_L}{P_{AVS}}$ $P_{DC} \rightarrow$



The way to do this is:



Capacitor & inductor both of very high values.

∴ Inductor doesn't allow any RF power to pass through. Only DC.

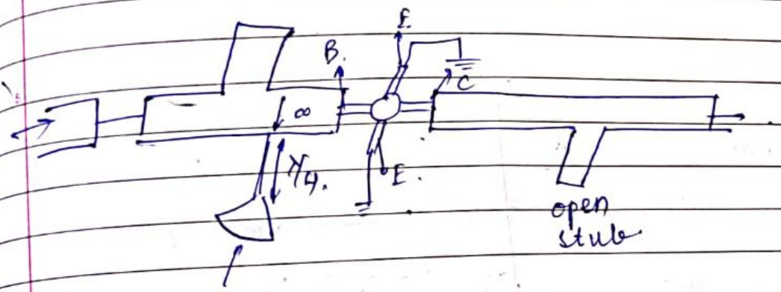
∴ For the RF source, inductor is oc

∴ Capacitor is an oc for DC source

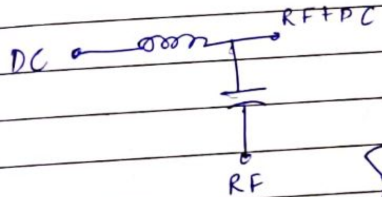
∴ Neither affects each other.

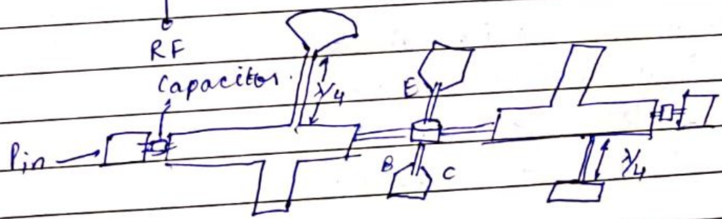
But this is ideal case: such high values of cap, ind: not possible.

But since we're operating at μwave freq we've certain techniques.



12-03-2019 Lecture 21

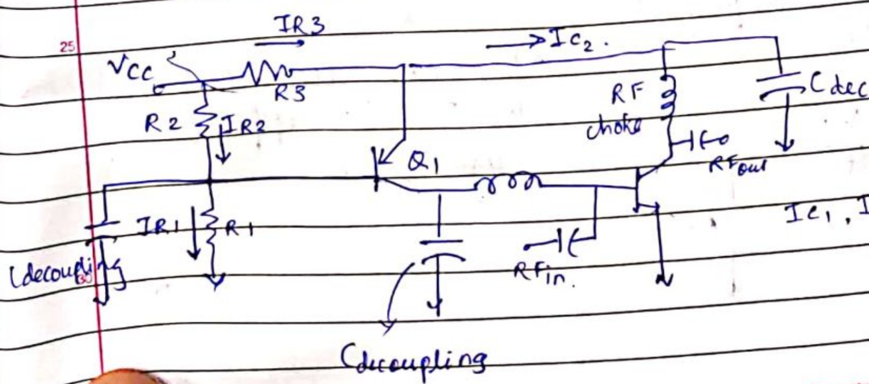




Active Bias network.

Q2 is our device.

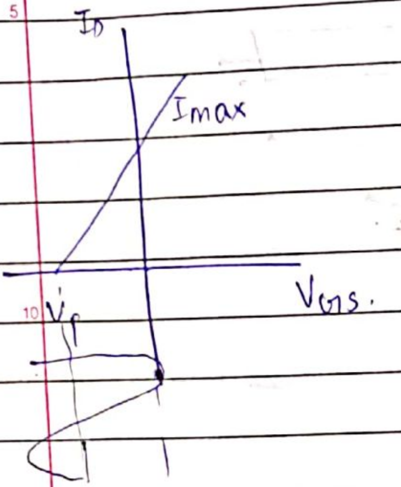
BJT → LDMOS, MOSFET, MESFET.

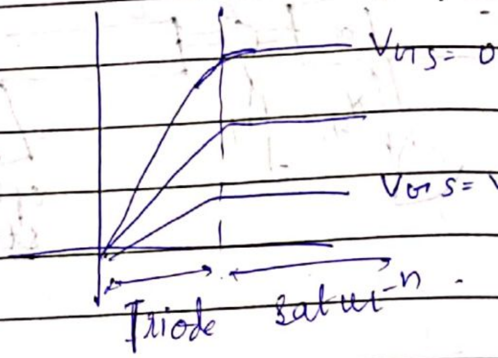


I_{C1}, I_{C2} formula.

$\cancel{I_C \approx (1+\beta_1)+\beta_2}$

Ideal FET





Conduction angle:

For $\alpha = 360^\circ \rightarrow$ class A

$180^\circ < \alpha < 360^\circ \rightarrow$ class AB

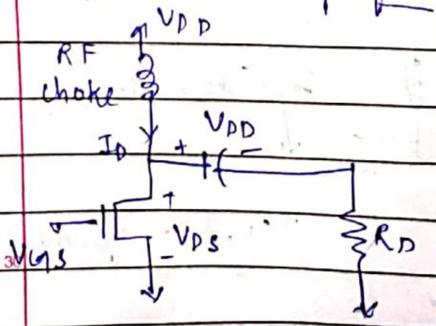
$\alpha = 180^\circ \rightarrow$ class B

$\alpha < 180^\circ \rightarrow$ class C.

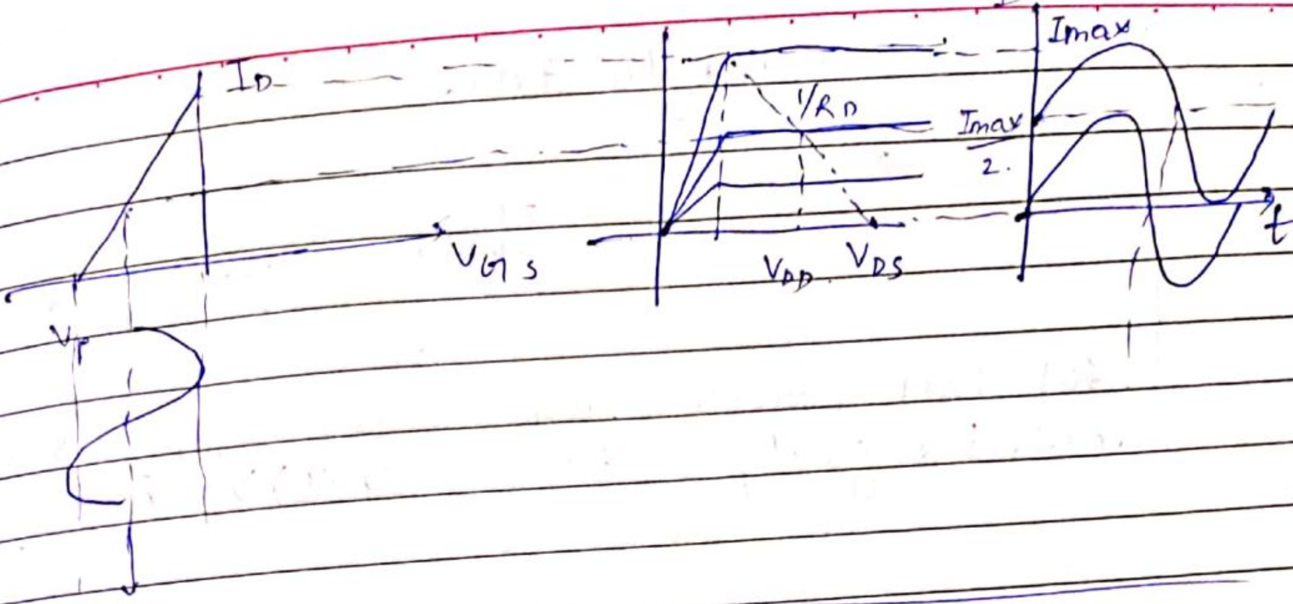
Low noise amplifiers $\rightarrow$ ON. always

Power amplifiers $\rightarrow$ partially kept on, partially off. Improves duty cycle.

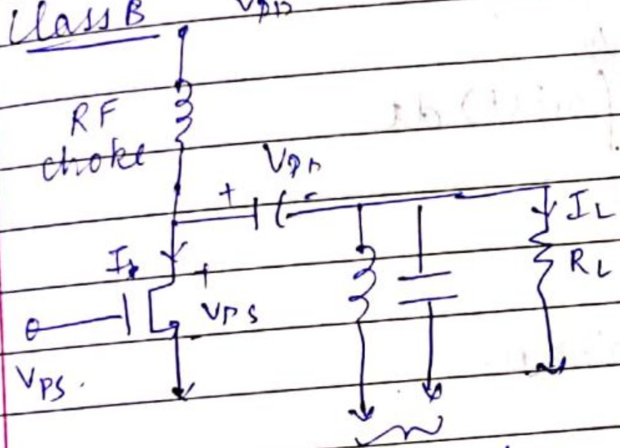
Class A amplifier



RF choke allows on DC to appear at Drain.



Class B



resonator.
can tune
so that
only one
freq appears
at o/p.

{Notes:
classes A, B, C
go through &
understand}
⇓
Quiz → draw
char of class C

X BIAS.

NOISE

problem → not deterministic.
→ random.

Time average: $\langle n(t) \rangle = \lim_{T \to \infty} \frac{1}{T} \int_{-T/2}^{T/2} n(t)\,dt$.

$$\overline{n(t)} = \int_{-\infty}^{\infty} n(t)\, \underbrace{P_n(n)}_{\text{Prob. density function}}\, dn.$$

for this course, we use $\langle n(t) \rangle$ and $\overline{n(t)}$ interchangably. i.e. $\langle n(t) \rangle = \overline{n(t)}$.

Mean square power.

$$\langle n^2(t) \rangle = \lim_{t \to \infty} \frac{1}{T} \int_{-T/2}^{T/2} n^2(t)\, dt$$

$$\overline{n^2(t)} = \int_{-\infty}^{\infty} n^2(t) P_n(n)\, dn.$$

Stationary process

statistics remain same over time.

Weiner Klint Chint Theorem

Autocorrelation function.

$$R(\tau) = \int_{-\infty}^{\infty} x^*(t)\, x(t+\tau)\, dt$$

Spectral Density function.

$$S_x(f) = \lim_{T \to \infty} \frac{\overline{|X_T(f)|^2}}{T}$$

$$R(\tau) = \mathcal{F}^{-1}(S_x(f))$$