

## Solution: i) DC Analysis: At DC $\rightarrow f = 0 Hz$ > IG≈O .. Open-circuit capacitors for DC analysis

$$V_{DS} = V_{DD} - I_{D}R_{D}$$

$$V_{GS} = V_{DS} = V_{DD} - I_{D}R_{D} = 12 - I_{D} \times 2000 \dots (1.1)$$

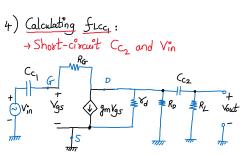
$$\Rightarrow$$
 Assuming NMOS-E is in saturation region,  
 $I_D = R_n(V_{dS} - V_{dS}(th))^2$ 

$$i_{e}^{s} I_{D} = 0.24 \times 10^{-3} \times (V_{GS} - 3)^{2} \dots (1.2)$$

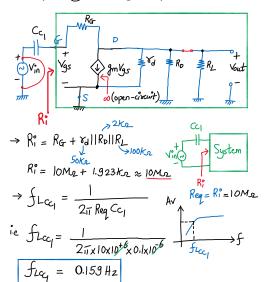
 $V_{GSQ} = 6.4V$   $V_{GS} = -2.49V$   $V_{GS} = -2.49V$ 

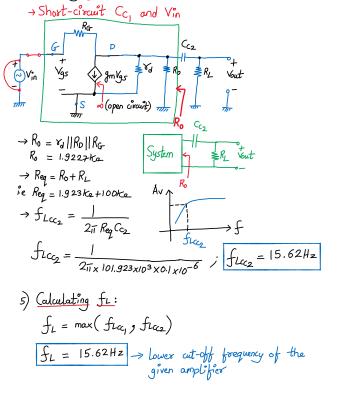
$$\Rightarrow \text{Ina} = \text{kn} \left( \text{VGSQ} - \text{VGS(Hh)} \right) = 0.24 \times 10^{-3} \times \left( 6.4 - 3 \right)^2$$

→ IDQ = 2.77 mA



Low-frequency small signal equivalent circuit





5) Calculating flcc2: