Seminar 3:

P2. Diodă reală

PSF → $I_D^{DC} = 2.5\ mA$

$U_D^{DC} = 0.7V$

U_{pol} → DC

Suprapus peste U_{pol}:

$u_d(t) = 10 \sin \omega t\ mV = U_d^{AC}$

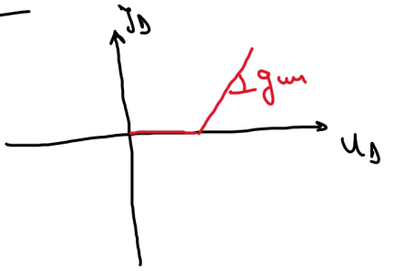
$i_d(t) = ?$

$u_d(t) = ?$

pt. diode uzuale

putem aproxima

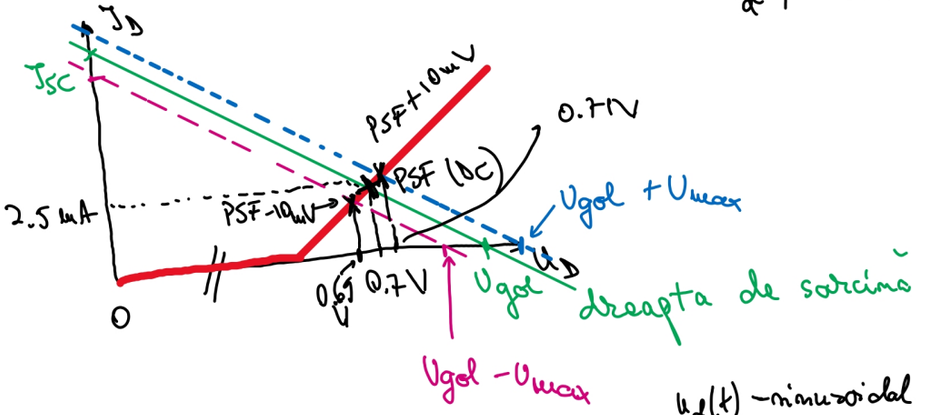
$g_m = 40 \cdot I_d \ \frac{mA}{V}$

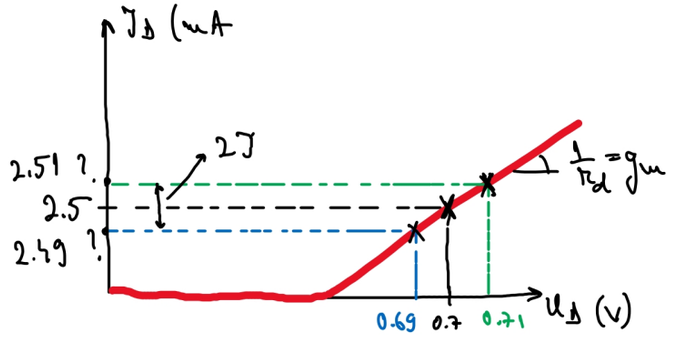


$g_m = 40 \times 2.5\ \frac{mA}{V} = 100\ mA/V = 0.1\ \frac{A}{V}$

AC → model practic

$u_d(t)$ variază → $i_d(t)$ variază





$u_d(t)$ - sinusoidal (nu avem elemente reactive (C, L))

$\Downarrow$

$i_d = J \cdot \sin \omega t$

$u_d(t) = r_d \cdot i_d(t) \Rightarrow$

$\Rightarrow i_d(t) = \frac{1}{r_d} \cdot u_d(t)$

$i_d(t) = g_m \cdot u_d(t)$

$J \sin \omega t = 0.01 (\sin \omega t) \cdot g_m$

$J = 0.01 \cdot g_m$ → amplitudinea lui $i_d(t)$

$J = 0.01 \times 0.1 = 0.001\ A = 1\ mA$

$i_d(t) = \sin \omega t \ (mA)$

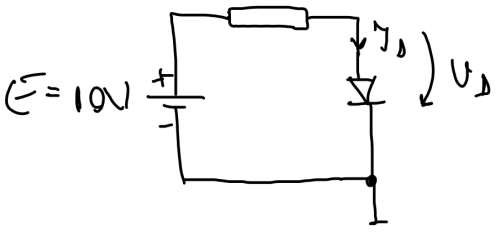
P3)

$U_{des} = 0.7V$

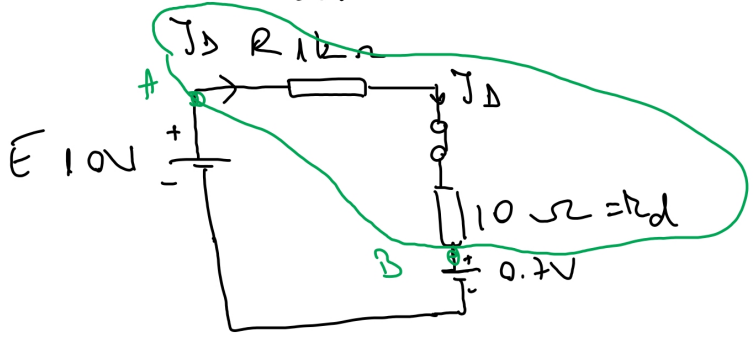
$g_m = 100 \, mA/V$

$I_D = ?$

$R = 1k\Omega$



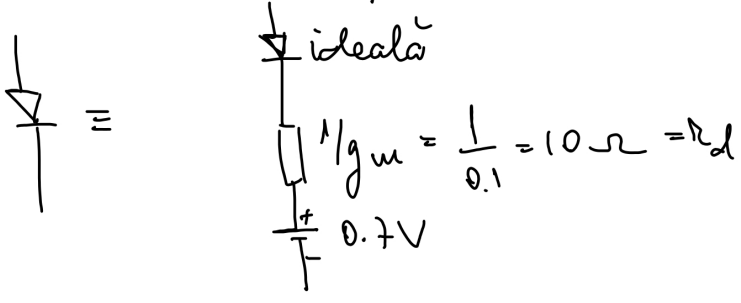
Schema echivalentă:



$V_A = 10V$

$V_D = 0.7$

folosim modelul practic



$V_A - V_B = I_D (R + r_d)$

$10 - 0.7 = I_D (1000 + 10) \Rightarrow$

$\Rightarrow I_D = \frac{9.3V}{1010\Omega} = 9.2 \, mA$

P4.)

$V_{out} = f(V_{in})$

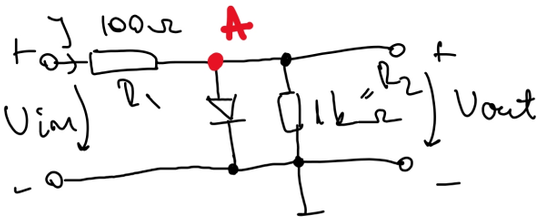
$(V_{in} \in -32 \to 32\ V)$

Param. diodă:

$V_{des} = 0.7V$ } $\Rightarrow$ modelul idealizat

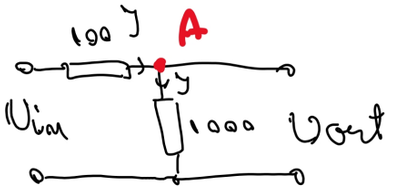
$r_d \simeq 0$

model idealizat ⏚ ≡ ideală + 0.7V −



$V_{in} = ?$ a.î. $V_A = 0.7V = V_{out}$

fără diodă →



$V_{in} = ? \times 1100$

$V_{out} = ? \times 1000$

$\frac{V_{out}}{V_{in}} = \frac{1000}{1100} \Rightarrow$

$\Rightarrow V_{out} = V_{in} \times 0.91$

Dacă $V_{out} = 0.7V = V_A$

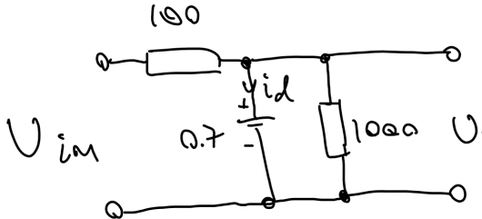
$0.7V = V_{in} \times 0.91 \Rightarrow$

$\Rightarrow V_{in} = \frac{0.7}{0.91} = 0.77$

$-32 \leq V_{in} < 0.77V \Rightarrow V_{out} = V_{in} \times 0.91$

$V_A \geq 0.7V$ → diodă în circuit

⇓



$\Rightarrow V_{out} = 0.7V$ pt. $V_{in} \geq 0.77V$