Izpit 18.1.2005 Blaž Medle

1) $\Delta\lambda = 1\,nm$

$\lambda_0 = 1550\,nm$

$\Delta f = ?$

$$\Delta f = \frac{\Delta\lambda \cdot c_0}{\lambda_0^2} = \frac{1 \cdot 10^{-9} \cdot 3 \cdot 10^{8}}{(1550 \cdot 10^{-9})^2} = \underline{\underline{125\,GHz}}$$

2) $d = ?$

slabljenje $= 0{,}5 = \eta$

$2r_j = 10\,\mu m$

$2r_o = 125\,\mu m$

$NA = 0{,}1$

$$\eta = \frac{r_j^2}{(r_j + d \cdot NA)^2} \Rightarrow \frac{r_j^2}{\eta} = r_j^2 + 2 r_j d NA + d^2 NA^2$$

$$NA^2 d^2 + 2 r_j \cdot NA \cdot d + r_j^2 \left(1 - \frac{1}{\eta}\right) = 0$$

$$0{,}01 \cdot d^2 + 10^{-6} d - 2{,}5 \cdot 10^{-11} = 0$$

$$d = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = 20{,}7\,\mu m$$

3)

$I_k = 20\,mA$

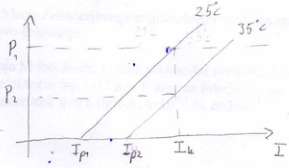
$T_1 = 25^\circ C$ $\quad T_2 = 35^\circ C$

$I_{p1} = 15\,mA$ $\quad I_{p2} = 20\,mA$

$P_{1dBm} = 3\,dBm$ $\quad P_2 = ?$

$\Downarrow$

$P_{1dBm} = 10 \log P_{mW} \Rightarrow P_{mW} = 10^{\frac{3}{10}} = 2\,mW$



$$P' = P \cdot \frac{I_k - I_{p2}}{I_k - I_{p1}} = 2 \cdot \frac{20-20}{20-15} = \underline{\underline{0\,mW}}$$

4)

Vhodni signal razdelimo na dva dela, enega pošljemo direktno na izhod, drugega pa pošljemo skozi snov v električnem polju. S spreminjanjem polja spreminjamo lomni količnik snovi (n) in s tem tudi hitrost signala, zato pride ta signal na izhod zamaknjen. Ko oba signala spet seštejemo, dobimo AM signal.

5) $P = 0\,dBm = 1\,mW$ $\quad I = 12\,mA$

$\lambda = 1{,}3\,\mu m$ $\quad \eta = 0{,}6$

$$M = \frac{I \cdot h \cdot c}{|Q_{el}| \cdot \eta \cdot P \cdot \lambda} = 19$$