I. BELL dan ATTENUATOR

1. SATUAN BELL, DECIBELL, DECIBELL MILLI

DAYA :

1 BELL = $^{10}\log \frac{P_o}{P_i}$ (B)

1 deciBELL = 0.1 BELL

1 BELL = 10 log $\frac{P_o}{P_i}$ (dB)

TEGANGAN :

P = $\frac{V^2}{R}$

dB = 10 log $\frac{P_o}{P_1}$ = 10 log $\frac{V_o{}^2/R_o}{V_i{}^2/R_i}$

= 10 log $\left(\frac{V_o{}^2}{V_i{}^2} . \frac{R_o}{R_i}\right)$

dB = 20 log $\frac{V_o}{V_i}$ + 10 log $\frac{R_i}{R_o}$

ARUS :

P = I^2 . R

dB = 10 log $\frac{P_o}{P_i}$ = 10 log $\frac{I_o{}^2 . R_o}{Y_i{}^2 . R_i}$

= 10 log $\left(\frac{I_o}{I_i}\right)^2$ + 10 log $\frac{R_o}{R_i}$

dB = 20 log $\frac{I_o}{I_i}$ + 10 log $\frac{R_o}{R_i}$

Untuk $R_o = R_i$ maka :

dB = 20 log $\frac{V_o}{V_i}$

dB = 20 log $\frac{I_o}{I_i}$

ANALISIS RANGKAIAN RESISTIF

$I_i = \frac{\begin{vmatrix} G & -R_2 \\ O & (R_2+R_3) \end{vmatrix}}{\begin{vmatrix} (R_1+R_2) & -R_2 \\ -R_2 & (R_2+R_3) \end{vmatrix}} = \frac{E\ (R_2+R_3)}{(R_1+R_2)(R_2+R_3) - R_2^2}$

$R_{in} = \frac{E}{I_1} = \frac{(R_1+R_2)(R_2+R_3)R_2^2}{R_2+R_3}$

$R_{in} = R_1 + R_2 - \frac{R_2^2}{(R_2+R_3)}$

Untuk $R_3 \gg R_1 + R_2$, akan diperoleh

$$\frac{V_L}{E} = \frac{R_2}{R_1 + R_2}$$

Jika $\frac{R_2}{R_1 + R_2} = a$, maka rugi akibat penyisipan (insertion loss) $\frac{I_2}{I}$ sebesar :

$$\frac{I_2}{I} = \frac{a}{I + a\,(I-a)(R/R_L)}$$

2. ATENUATOR

Attenuator bentuk T

(1) PEREDAMAN

$$\frac{I_2}{I} = \frac{R_3\,(R_S + R_L)}{(R_S + R_1 + R_3)(R_2 + R_3 + R_L) - R_3^2} = \text{I.L.}$$

(2) PENENTUAN KOMPONEN

$$\text{I.L} = \frac{R_O - R}{R + R_O}$$

$$R_3 = \frac{2\,R_O\,(I.L)}{1-(IL)^2}$$

$$R = R_o\,\frac{1-I.L}{1+I.L}$$

Attenuator bentuk π

$$R_A = \frac{R_1 R_2 + R_1 R_3 + R_2 R_3}{R_2}$$

$$R_B = R_A \cdot \frac{R_2}{R_1}$$

$$R_c = R_A\,\frac{R_2}{R_3}$$

Bentuk π simetri

$$R = R_o\,\frac{1+I.L}{1-I.L}$$

$$R_c = \frac{R_o}{2}\,\frac{1-(IL)^2}{IL}$$

Attenuator bentuk L

$$R_3 = R_1 + \frac{R_3 . R_L}{R_3 + R_L} \qquad (R_L < R_3)$$

$$R_1 = \sqrt{R_3\,(R_3 - R_L)}$$

$$R_2 = \sqrt{R_L\,(R_L - R_3)} \qquad (R_L > R_3)$$

$$R_L = \frac{R_3\,(R_1 + R_3)}{R_3 + R_1 + R_3} \qquad (R_L < R_3)$$