

Pengantar Kuliah

Elektronika

(TKE 4012)

Eka Maulana

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Silabus Elektronika (TKE 4012)

- **Tujuan:**

Memberikan pemahaman dasar mengenai **karakteristik komponen-komponen semikonduktor**, kemampuan pengaktifan rangkaian yang dibentuk oleh komponen tersebut, kemampuan melakukan **analisa dc dan ac**, serta teknik perancangan rangkaian penguat transistor dan op-amp.

- **Pokok Bahasan:**

Teori semikonduktor: diode dan rangkaian diode; Pembiasan BJT dan pembiasan FET; Pengenalan thyristor; Analisa dasar Op-Amp; Analisis sinyal kecil penguat transistor BJT dan FET; Penguat bertahapan jamak (multistage amplifier); Pengaturan tegangan dan stabilitas termal; Penguat umpan balik dan osilator serta penguat daya.

Daftar Pustaka:

- A.P. Malvino, Prinsip-prinsip Elektronik; edisi kedua, terjemahan: Hanapi Gunawan. Jakarta: Penerbit Erlangga, 1992.
- Jimmie J. Cathey, Theory and Problem of Electronic Devices and Circuits. Mc. Graw Hill. 1989.
- Milman & Halkias. Integrated Electronic Analog and Digital Circuits and System. Tokyo: Mc. Graw Hill. 1982.
- Panca Mudjirahardjo. Dasar Elektronika, soal dan pembahasan. Edisi Pertama. Malang: Penerbit Jurusan Teknik Elektro UB, 2009.
- Robert Boylestad and Louis. Electronic Devices and Circuit Theory. Prentice Hall. 1997.

Pertemuan Kuliah

1. Pengantar Kuliah (Preview)
2. Teori Semikonduktor
3. Dioda dan Rangkaian Dioda
4. Pembiasan BJT dan FET
5. Q1
6. Thyristor
7. Analisis Op-amp
8. Analisis Sinyal Kecil
9. Multistage Amplifier
10. Q2
11. Pengaturan Tegangan dan Stabilitas Termal
12. Penguat umpan balik
13. Osilator
14. Penguat Daya
15. Q3
16. Review

Preview

- **Tiga Formula Penting**
- **Pendekatan-pendekatan**
- **Sumber Tegangan**
- **Sumber Arus**
- **Teorema-teorema**

#1 Formula Penting

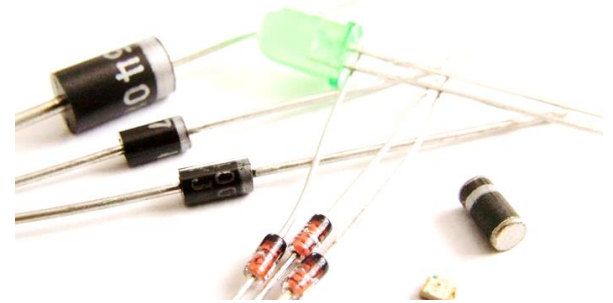
- **Definition:** *A formula invented for a new concept*
- **Law:** *A formula for a relationship in nature*
- **Derivation:** *A formula produced with mathematics*

For all practical purposes, a formula is like a set of instructions written in mathematical shorthand. A formula describes how to go about calculating a particular quantity or parameter.

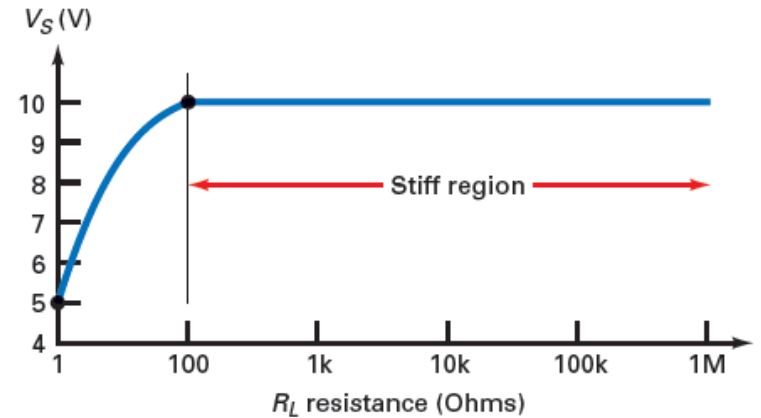
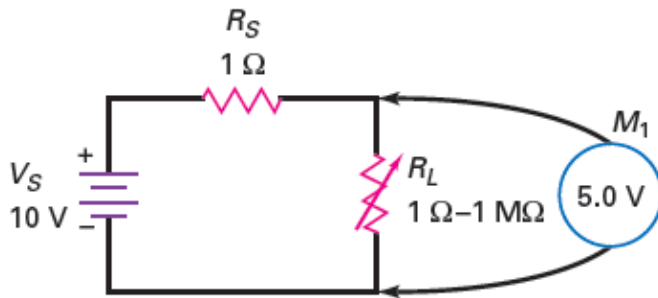
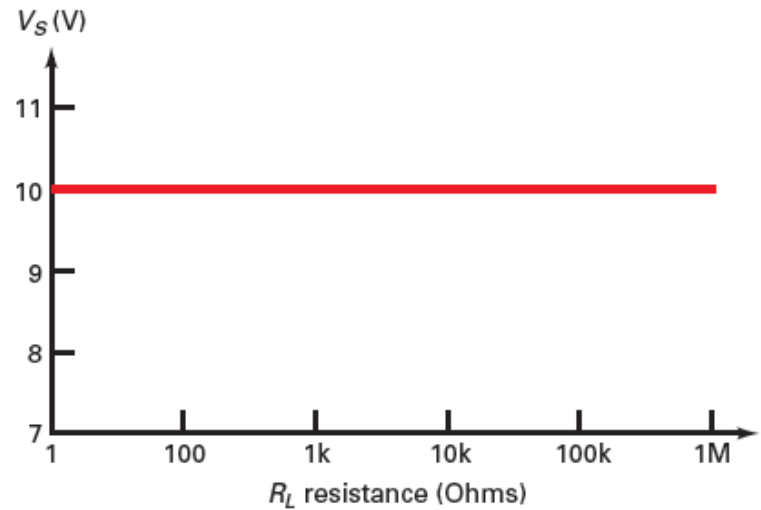
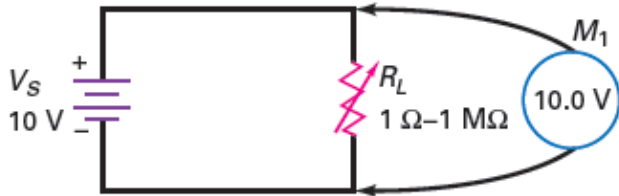
#2 Aproksimasi

- First Aproximation (Pendekatan Ideal)
- Second Aproximation
- Third Aproximation

Contoh:



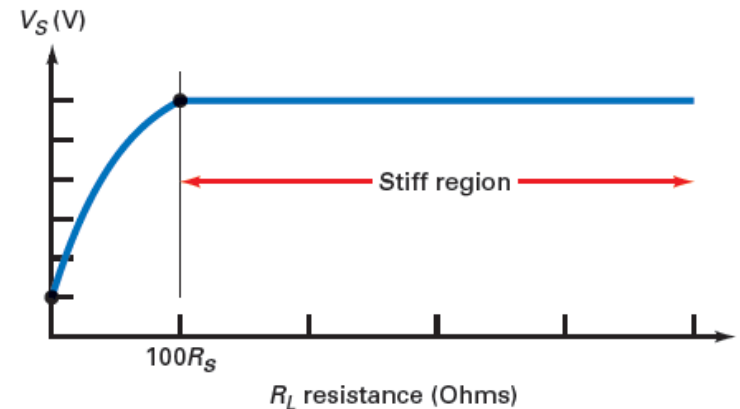
#3 Sumber Tegangan



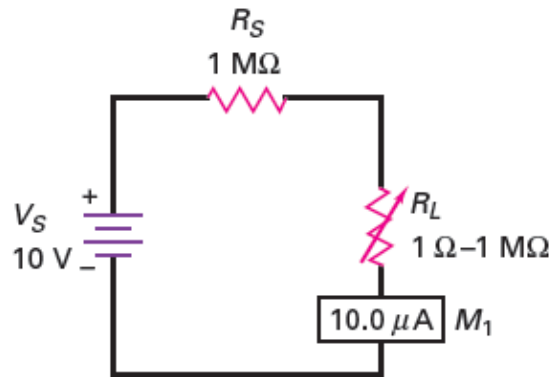
Stiff voltage source: $R_S < 0.01R_L$

$$R_S = 0.01R_L$$

$$R_{L(\min)} = 100R_S$$



#4 Sumber Arus

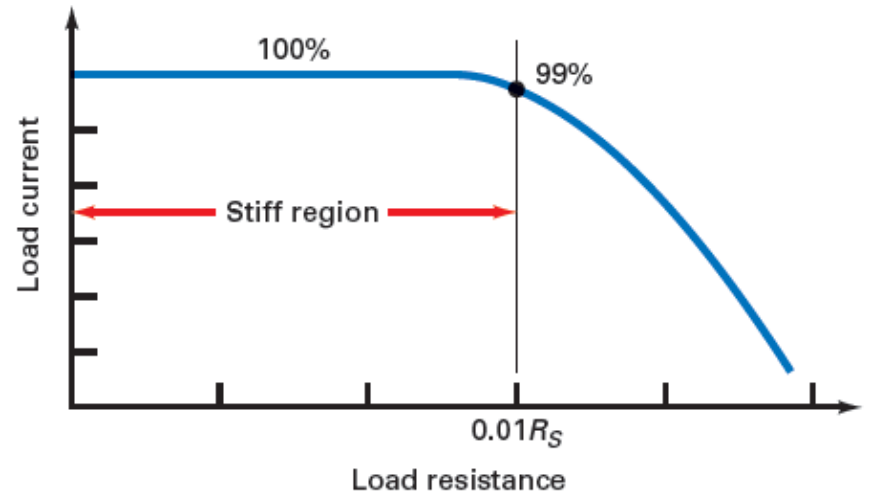
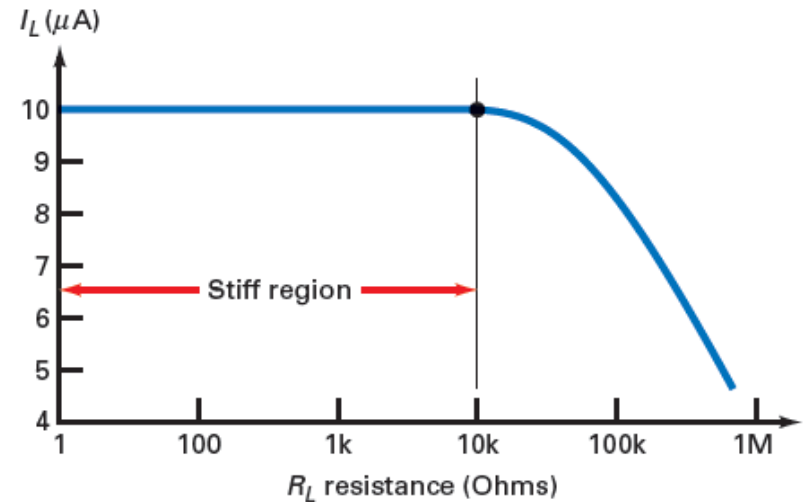


$$I_L = \frac{V_S}{R_S + R_L}$$

Stiff current source: $R_S > 100R_L$

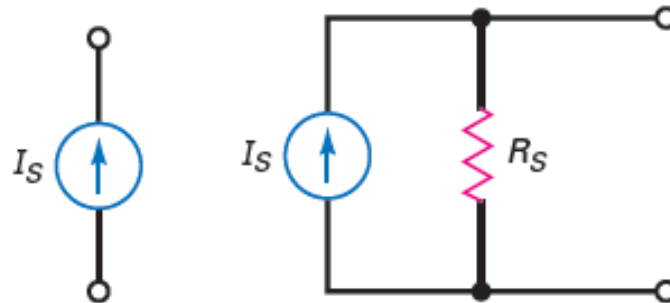
$$R_S = 100R_L$$

$$R_{L(\text{max})} = 0.01R_S$$



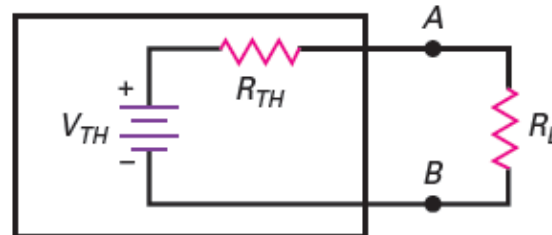
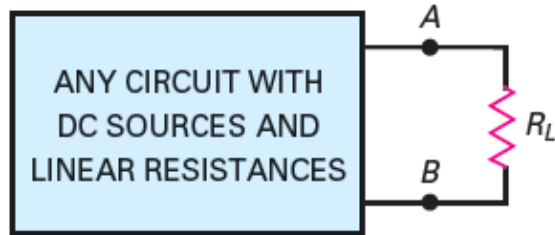
Sifat Sumber Tegangan dan Arus

Quantity	Voltage Source	Current Source
R_S	Typically low	Typically high
R_L	Greater than $100R_S$	Less than $0.01R_S$
V_L	Constant	Depends on R_L
I_L	Depends on R_L	Constant



#5 Teorema

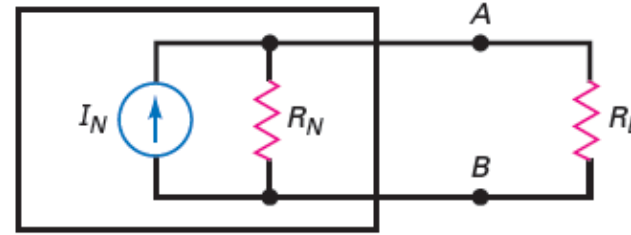
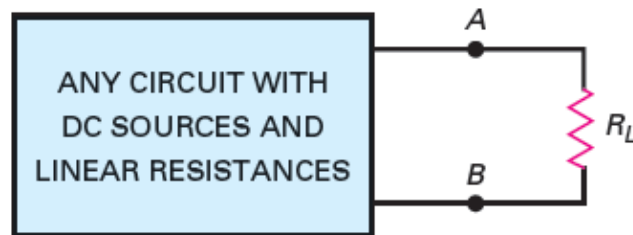
- Thevenin



$$V_{TH} = V_{OC}$$
$$R_{TH} = R_{OC}$$

$$I_L = \frac{V_{TH}}{R_{TH} + R_L}$$

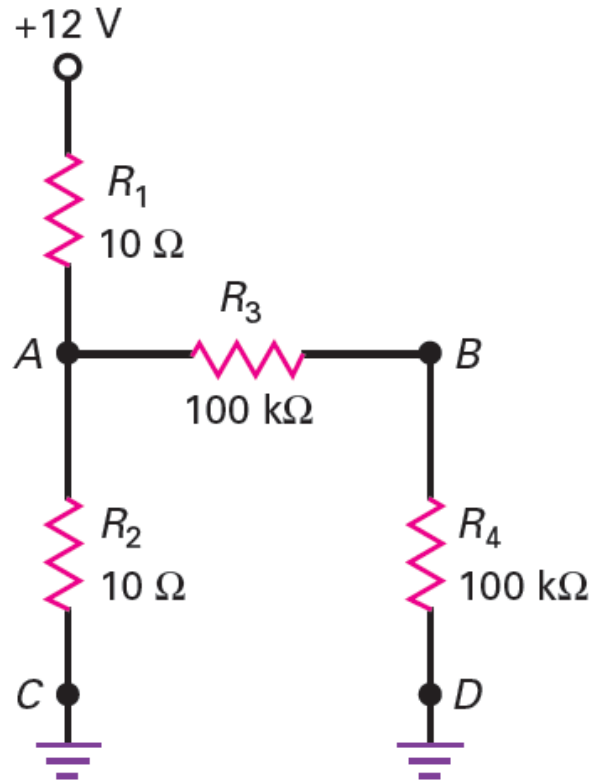
- Northon



$$R_N = R_{TH}$$
$$I_N = I_{SC}$$
$$R_N = R_{OC}$$

$$V_L = I_N(R_N \parallel R_L)$$

Troubleshooting



Trouble	V_A	V_B
Circuit OK	6 V	3 V
R_1 open	0	0
R_2 open	12 V	6 V
R_3 open	6 V	0
R_4 open	6 V	6 V
C open	12 V	6 V
D open	6 V	6 V
R_1 shorted	12 V	6 V
R_2 shorted	0	0
R_3 shorted	6 V	6 V
R_4 shorted	6 V	0