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A. Topology

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1																wire	wire	wire	wire	Voltmeter	wire	wire	wire	wire	wire
2																wire			wire			wire		wire	wire
3																wire			wire	Resistor_L	wire	Ammeter	wire		wire
4																wire			wire						wire
5																wire	wire	wire	wire	Voltmeter	wire	wire	wire	wire	wire
6																wire			wire			wire			wire
7																wire			wire	Resistor_L	wire	Ammeter	wire		wire
8																wire									wire
9																wire	wire	wire	wire	Voltmeter	wire	wire	wire	wire	wire
10																wire			wire			wire			wire
11																wire			wire	Resistor_L	wire	Ammeter	wire		wire
12																wire									wire
13																wire									wire
14																wire									wire
15																wire									wire
16																wire									wire
17	wire	wire	Ammeter	wire	Resistor	F	wire	Diode	D	Inductor	L	wire	Resistor	F	wire	wire	wire	wire	wire						wire
18	wire															wire									wire
19	wire															wire									wire
20	wire	wire	wire									wire	wire	wire		wire									wire
21	wire	wire	wire									wire	wire	wire		wire									wire
22	wire	wire	wire									wire	wire	wire		wire									wire
23	Resistor	R	Source	wire								Capacitor	C	filter	wire										wire
24	wire		Voltmeter	V	Source							wire		Voltmeter	C	filter									wire
25	Voltage	Source	V	Source	wire							Resistor	C	filter	wire										wire
26	wire		wire									wire		wire											wire
27	wire		wire									wire		wire											wire
28	wire	wire	wire									wire	wire	wire											wire
29	wire											wire		wire											wire
30	wire											wire		wire											wire
31	wire	wire	wire	wire	wire	wire	wire	Resistor	F	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire	wire

B. Brief explanation

(Dalam bentuk hitungan)

Diketahui :

- Minimum Voltage = 2 V
- $I_{max} = 2 \text{ mA}$
 $= 2 \cdot 10^{-3} \text{ A}$
 $= 0.02 \text{ A}$
- $V_{gen} = 5 \text{ V}$
- Frequency = 20 Hz
- Internal Resistance = 0.1 Ω

Value Resistor, Capacitor, dan Inductor :

No	Component	Value
1	Resistor	3 Ω
2		24 Ω
3		36 Ω
4		100 Ω
5		130 Ω
6		220 Ω
7		510 Ω
8	Capacitor	1.0 μF
9		3.3 μF
10		22 μF
11	Inductor	2 μH
12		5.1 μH
13		2 mH
14		400 mH

Resistor Paralel

$$\begin{aligned}\frac{1}{R_p} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \\ &= \frac{1}{1} + \frac{1}{1} + \frac{1}{1} \\ &= \frac{1}{3} \Omega\end{aligned}$$

$I_{Max} = 0.02 \text{ A}$, jadi kita cari yang dibawah 2 A

Substitusi nilai resistor :

1. 3Ω

$$R = \frac{1}{3} \cdot 3$$

$$R = 1 \Omega$$

$$I = \frac{2}{1} = 2 A$$

$2 < 0.02 A$, **False**, jadi tidak dapat digunakan

2. 24Ω

$$R = \frac{1}{3} \cdot 24$$

$$R = 8 \Omega$$

$$I = \frac{2}{8} = 0.25 A$$

$0.25 < 0.02$, **False**, jadi tidak

dapat digunakan

3. 36Ω

$$R = \frac{1}{3} \cdot 36$$

$$R = 12 \Omega$$

$$I = \frac{2}{12} = 0.167 A$$

$0.167 < 0.02$, **False**, jadi tidak

dapat digunakan

4. 100Ω

$$R = \frac{1}{3} \cdot 100$$

$$R = 33.34 \Omega$$

$$I = \frac{2}{33.34} = 0.06 A$$

$0.06 < 0.02$, **False**, jadi tidak

dapat digunakan

5. 130Ω

$$R = \frac{1}{3} \cdot 130$$

$$R = 43.334 \Omega$$

$$I = \frac{2}{43.334} = 0.046 A$$

$0.046 < 0.02$, **False**, jadi tidak

dapat digunakan

6. 220Ω

$$R = \frac{1}{3} \cdot 220$$

$$R = 73.334 \Omega$$

$$I = \frac{2}{73.334} = 0.0272 A$$

$0.0272 < 0.02$, **False**, jadi tidak dapat digunakan

7. 510Ω

$$R = \frac{1}{3} \cdot 510$$

$$R = 170 \Omega$$

$$I = \frac{V}{R}$$

Generator Resistor

Cari yang paling mendekati nilai I_{Max} , yaitu $0.02 A$

1. 3Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{3} = 1.667 A$$

2. 24Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{24} = 0.208 A$$

3. 36Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{36} = 0.139 A$$

4. 100Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{100} = 0.05 A$$

5. 130Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{130} = 0.0384 A$$

6. 220Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{220} = 0.023 A$$

7. 510Ω

$$I = \frac{V_{gen}}{R_{gen}}$$

$$I = \frac{5}{510} = 0.01 A$$

Dari semua generator resistor, yang paling mendekati I_{Max} (0.02) adalah $R_{gen} = 220 \Omega$, dengan nilai $I = 0.023 A$

$$I = \frac{2}{170} = 0.012 A$$

0.012 < 0.02, **True**, jadi **dapat** digunakan

$$R_1 = R_2 = R_3 = 510 \Omega$$

C. Value of Each Component

1.	Component type: Ammeter Component name: Isource Component position: 17C Positive direction of current: 17D	15.	Component type: Resistor Component name: load3 Component position: 11T Resistor value: 510.0	Edit parameters
2.	Component type: Ammeter Component name: load1 Component position: 3V Positive direction of current: 3W	16.	Component type: VoltageSource Component name: Vsource Component position: 25A Peak value: 7.071 Frequency: 20.0 Phase angle: 0.0 Dc offset: 0.0 Positive polarity: 24A	Edit parameters
3.	Component type: Ammeter Component name: load2 Component position: 7V Positive direction of current: 7W	17.	Component type: Voltmeter Component name: Cfilter Component position: 24M Voltage level: 1000.0 Positive direction of voltage: 23M	Edit parameters
4.	Component type: Ammeter Component name: load3 Component position: 11V Positive direction of current: 11W	18.	Component type: Voltmeter Component name: Vsource Component position: 24C Voltage level: 1000.0 Positive direction of voltage: 23C	Edit parameters
5.	Component type: Capacitor Component name: Cfilter Component position: 23K Capacitor value: 1e-06 Positive polarity: 22K	19.	Component type: Voltmeter Component name: load1 Component position: 1T Voltage level: 1000.0 Positive direction of voltage: 1S	Edit parameters
6.	Component type: Diode Component name: Dfilter Component position: 17G Voltage level: 1000.0 Direction of cathode: 17H	20.	Component type: Voltmeter Component name: load2 Component position: 5T Voltage level: 1000.0 Positive direction of voltage: 5S	Edit parameters
7.	Component type: Inductor Component name: Ifilter Component position: 17F	21.	Component type: Voltmeter Component name: load3 Component position: 9T Voltage level: 1000.0 Positive direction of voltage: 9S	Edit parameters
8.	Component type: Resistor Component name: Cfilter Component position: 25K Resistor value: 0.01			
9.	Component type: Resistor Component name: Ramm Component position: 17E Resistor value: 0.01			
10.	Component type: Resistor Component name: Rfilter Component position: 17J Resistor value: 0.01			Edit parameters
11.	Component type: Resistor Component name: Rload Component position: 31H Resistor value: 220.0			Edit parameters
12.	Component type: Resistor Component name: Rsource Component position: 23A Resistor value: 0.01			Edit parameters
13.	Component type: Resistor Component name: load1 Component position: 3T Resistor value: 510.0			Edit parameters
14.	Component type: Resistor Component name: load2 Component position: 7T Resistor value: 510.0			Edit parameters

Arah :

VoltageSource ->

Clockwise/searah jarum jam

Ammeter -> Clockwise/searah

jarum jam

Diode ->

Clockwise/searah jarum jam

Capacitor ->

Counterclockwise/berlawanan

arah jarum jam

Voltmeter ->

Counterclockwise/berlawanan

arah jarum jam

Value :

- Capacitor (Cfilter) = $1.0 \mu F$
= $1 \times 10^{-6} F = 1e-06 F$
- Diode (Voltage Level) = Rated Voltage
= 1000 V (by default, karena memerlukan tegangan tinggi)
- Inductor (Ifilter) = 2 mH
= $2 \times 10^{-3} H = 0.002 H$
- Resistor (Rsource) = 0.012Ω (Dari perhitungan soal B, nilainya kecil agar dapat menjaga stabilitas tegangan)
- Resistor (Rload1-3) = 510Ω (Dari perhitungan R1, R2, R3 pada soal B)
- VoltageSource (Peak Value) = $V * \sqrt{2}$
= $5 * \sqrt{2}$
= 7.071 V
- VoltageSource (Frequency) = 20 Hz (Diketahui soal)
- Voltmeter (load1-3) = Rated Voltage
= 1000 V (by default, karena memerlukan tegangan tinggi)

D. Plot untuk membuktikan minimal 2V dan gak boleh melebihi 20 mA

1. Plot untuk Voltmeter (minimum voltage) :

2. Plot untuk Ammeter (amount of current):

