<h1 style="text-align: center;">VOLTAGE SUMMING</h1>
MENU SEBELUMNYA

DAFTAR ISI

1. Tujuan

2. Alat dan Bahan

3. Dasar Teori

   3.1. Example

    3.2. Problem

    3.3. Soal Pilihan Ganda

4. Percobaan

5. Link Download

<h3 style="text-align: justify;">
</h3><h2>1. Tujuan

[Daftar] </h2>

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aplikasi dari Voltage summing dalam rangkaian listrik <li style="margin: 0px 0px 0.25em; padding: 0px; text-align: justify;"><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; line-height: normal; margin: 0cm 0cm 3pt 18pt;">Mampu mengaplikasikan dan membuat rangkaian berkaitan dengan materi Voltage summing <li style="margin: 0px 0px 0.25em; padding: 0px; text-align: justify;"><p class="MsoNormal" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; line-height: normal; margin: 0cm 0cm 3pt 18pt;">Memenuhi penugasan Elektronika yang
diberi oleh Bapak Darwison, M.T

<h3 style="text-align: justify;">
</h3><h3 style="text-align: justify;">2. Alat dan Bahan

[Daftar]</h3>
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style="background-color: black;">1. Osiloskop</u></h3> <ul
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font-family: times; font-size: medium;">Osiloskop adalah <span style="border: 0px;
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yang mempunyai kemampuan <span style="border: 0px; margin: 0px; outline:
0px; padding: 0px; vertical-align: baseline;">menyimpan electron-elektron selama waktu
yang tidak tertentu. Osiloskop dilengkapi dengan tabung sinar katode. Peranti
pemancar elektron memproyeksikan sorotan elektron ke layar tabung sinar
katode. <span
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style="background-color: black; clear: both; text-align: center;">
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</h3><h3 style="box-sizing: border-box; line-height: 1.1; margin-bottom: 10px; margin-top: 0px;">Cara Menggunakan Multimeter :</h3></blockquote><ol style="box-sizing: border-box; margin-bottom: 11.5px; margin-top: 0px; text-align: left;">
<li style="box-sizing: border-box;">Perhatikan terlebih dahulu jarum penunjuk yang memperlihatkan skala pengukuran.
<li style="box-sizing: border-box;">Perhatikan pula pengaturan knob atau saklar yang digunakan untuk mengatur fungsi Ampere, Voltage, ataupun Ohm. Lalu lakukan setting juga pada skala x1, x10 atau yang lainnya. Pastikan knob pada posisi Off

saat sudah tidak digunakan lagi.
<li style="box-sizing: border-box;">Tentukan lubang untuk memasukkan kabel jack sesuai dengan fungsi yang diinginkan. Terdapat dua lubang yaitu (+) dan (–) yang nantinya menunjukkan polaritas dari tegangan atau probe.
<li style="box-sizing: border-box;">Cek kembali apakah baterai telah terpasang dengan baik. Pastikan kondisi baterai tersebut masih bagus dan berkualitas.   Spesifikasi : <blockquote style="border: none; font-family: Crushed; margin: 0px 0px 0px 40px; padding: 0px;"> > </blockquote>   Pin out :
<h3 style="text-align: left;">   <u>3. DC Generator</u></h3><blockquote

style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"> Generator arus searah (DC) adalah mesin berputar yang memasok output listrik dengan tegangan dan arus searah . Prinsip dasar operasinya sama dengan generator sinkron. </blockquote>
 <u style="background-color: black;">

</u><h3 style="clear: both; text-align: justify;"><u>
</u><span style="color:

white;">4<u>. Sine Generator</u></h3> <blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;"> Sebuah mesin yang mengubah energi mekanik menjadi energi listrik dikenal sebagai generator AC. Energi mekanik disuplai ke Generator AC melalui turbin uap, turbin gas, dan mesin pembakaran. Daya listrik bolak-balik berupa tegangan dan arus bolak-balik merupakan keluarannya. </blockquote>
 <h3 style="font-family: "Times New Roman"; text-align: left;"><u>B. Bahan</u></h3> <blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"><div style="padding: 0 px; width:

1300;"><h3 style="text-align: left;"><u style="background-color: black;">1 Resistor</u></h3> </blockquote><blockquote style="border: none; margin: 0px 0px 0px 40px; padding: 0px;">   <span lang="IN" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial;">Resistor<span lang="IN" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; text-indent: 18pt;"> atau disebut juga dengan Hambatan adalah komponen
elektronika pasif yang berfungsi untuk menghambat dan mengatur arus listrik
dalam suatu rangkaian elektronika. Satuan nilai Resistor atau Hambatan adalah Ohm. Spesifikasi dari resistor adalah resistansinya dan daya listrik yang
dapat dihantarkan. Karakteristik lain termasuk koefisien suhu, derau listrik
(noise), dan induktansi. Resistor dapat diintegrasikan kedalam sirkuit hibrida dan papan
sirkuit cetak, bahkan sirkuit terpadu. </blockquote> <a
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 <h3 style="text-align: justify;"><u style="background-color: black;">3) Ground</u></h3>   Dalam sistem
elektronika ground berarti sebuah titik referensi umum atau tegangan potensial
sama dengan “tegangan nol”. Ground bersifat relatif, karena dapat memilih titik
dimana saja dalam sirkuit untuk dijadikan ground untuk mereferensi semua
tegangan dalam rangkaian. Sistem grounding pada peralatan kelistrikan dan
elektronika adalah untuk memberikan perlindungan pada seluruh sistem. Simbol
grounding pada elektronika dasar maupun pada sistem kelistrikan digambarkan
pada gambar dibawah. Simbol ini diperlukan saat membuat gambar rangkaian
elektrik ataupun rangkaian elektronik. Berikut ini adalah beberapa simbol yang
menjelaskan arti grounding pada gambar
teknik.

<h3 style="text-align: justify;">3. Dasar Teori [Daftar]</h3><h3 style="text-align: justify;">A. VOLTAGE SUMMING</h3><h3 style="text-align: justify;">   <u style="text-align: left;">1) Summing amplifier (Penguat Penjumlah) atau Inverting Adder Amplifier</u></h3> <p class="MsoNormal" style="background-color: none; text-align: justify;">   <span style="cursor: url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4EwgNf6EpDhtwqjxi_RQUbqU6VBwD92JUC9LgpC360jHQtuPCIGgC6rGOqMDJH6jhkJknduYyL_njodWsFTvzrj6HJYxv6-rY83dPls6dmzPZfEn7G8qqw=s0-d"), url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4ExLQw6crxe5SXT9pjcpk3ksbZw97njd8GLxG3Ul8VIzAiTgrVH-s3vDemILmUayF5_h_pWbfhrBttOiQmCxYWwNR0B2S9rA_b7YlmdKfIdkRQE64K8t4HI=s0-d"), auto !important;"> Rangkaian <i style="cursor: url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4EwgNf6EpDhtwqjxi_RQUbqU6VBwD92JUC9LgpC360jHQtuPCIGgC6rGOqMDJH6jhkJknduYyL_njodWsFTvzrj6HJYxv6-rY83dPls6dmzPZfEn7G8qqw=s0-d"), url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4ExLQw6crxe5SXT9pjcpk3ksbZw97njd8GLxG3Ul8VIzAiTgrVH-s3vDemILmUayF5_h_pWbfhrBttOiQmCxYWwNR0B2S9rA_b7YlmdKfIdkRQE64K8t4HI=s0-d"), auto !important;"><span style="cursor: url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4EwgNf6EpDhtwqjxi_RQUbqU6VBwD92JUC9LgpC360jHQtuPCIGgC6rGOqMDJH6jhkJknduYyL_njodWsFTvzrj6HJYxv6-rY83dPls6dmzPZfEn7G8qqw=s0-d"), url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4ExLQw6crxe5SXT9pjcpk3ksbZw97njd8GLxG3Ul8VIzAiTgrVH-s3vDemILmUayF5_h_pWbfhrBttOiQmCxYWwNR0B2S9rA_b7YlmdKfIdkRQE64K8t4HI=s0-d"), auto !important;">Voltage Summing</i><span style="cursor: url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4EwgNf6EpDhtwqjxi_RQUbqU6VBwD92JUC9LgpC360jHQtuPCIGgC6rGOqMDJH6jhkJknduYyL_njodWsFTvzrj6HJYxv6-rY83dPls6dmzPZfEn7G8qqw=s0-d"), url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4ExLQw6crxe5SXT9pjcpk3ksbZw97njd8GLxG3Ul8VIzAiTgrVH-s3vDemILmUayF5_h_pWbfhrBttOiQmCxYWwNR0B2S9rA_b7YlmdKfIdkRQE64K8t4HI=s0-d"), auto !important;">/<i style="cursor: url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4EwgNf6EpDhtwqjxi_RQUbqU6VBwD92JUC9LgpC360jHQtuPCIGgC6rGOqMDJH6jhkJknduYyL_njodWsFTvzrj6

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Amplifier</i><span style="cursor:
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url("https://lh3.googleusercontent.com/blogger_img_proxy/ABLy4ExLQw6crxe5SXT9pj
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B2S9rA_b7YlmdKfIdkRQE64K8t4HI=s0-d"), auto !important;"> adalah rangkaian
elektronika yang berfungsi untuk menjumlahkan dua buah atau lebih tegangan listrik.
Rangkaian ini dibuat menggunakan IC <i style="cursor:
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Amplifier</i><span style="cursor:
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B2S9rA_b7YlmdKfIdkRQE64K8t4HI=s0-d"), auto !important;">.. Gambar 15.8
menunjukkan hubungan dengan keluaran menjadi penjumlahan dari ketiga masukan
tersebut, masing-masing dikalikan dengan keuntungan yang berbeda. Tegangan
keluarannya adalah</p> <div style="margin-left: 60px; text-align: justify;
text-indent: 0px;">

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justify;"><span style="background-color: black; color: white; font-family: times; font-size:
medium;"><img alt="" data-original-height="189" data-original-width="364"
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TBbdvdyqua54qkwiKQdiCOAP2UZLrGsTu5YH-mz1WFVezvrL2dZTK8rrKtWCHicjbvYKmz_
pqfa4NIDineieiRQ" width="320" />
Vo =
-[(Rf/R1) V1 + (Rf/R2) V2 + ... (Rf/Rn) Vn]
   =
- Rf (V1/R1 + V2/R2 + ... Vn/Rn)</p><p style="text-align: justify;">
<code class="hljs" style="background-attachment: initial; background-clip: initial;
background-image: none; background-origin: initial; background-position: initial;
background-repeat: initial; background-size: initial; border-radius: 0px; box-sizing:
border-box; display: block; line-height: inherit; overflow-x: auto; padding: 0px; text-align:
justify;"><span style="background-color: black; color: white; font-family: times; font-size:
medium;">(RF = R1 = R2 = R3 = ... Rn)</code><code class="hljs"
style="background-attachment: initial; background-clip: initial; background-image: none;
background-origin: initial; background-position: initial; background-repeat: initial;
background-size: initial; border-radius: 0px; box-sizing: border-box; display: block;
line-height: inherit; overflow-x: auto; padding: 0px; text-align: justify;">
</code><code class="hljs apache" style="background-attachment: initial;
background-clip: initial; background-image: none; background-origin: initial;
background-position: initial; background-repeat: initial; background-size: initial;
border-radius: 0px; box-sizing: border-box; display: block; line-height: inherit; overflow-x:
auto; padding: 0px; text-align: justify;"><span style="background-color: black; color: white;
font-family: times; font-size: medium;"><span class="hljs-attribute" style="box-sizing:
border-box;">Vo = - (V<span class="hljs-number" style="box-sizing:
border-box;">1 + V<span class="hljs-number" style="box-sizing:
border-box;">2 + ... Vn)</code></p><div class="separator" style="clear:
both; text-align: center;"><h3 style="clear: both; text-align: left;"><p style="box-sizing:
border-box; font-weight: 400; margin: 0px 0px 1em; text-align: justify;"><span
style="background-color: black; color: white; font-family: times; font-size:
medium;">Rangkaian summing dapat berupa non-inverting atau inverting. Tipe inverting
lebih mudah dalam perencanaan dan pembuatan daripada non-inverting. Bila output yang
diinginkan terbalik, maka sebuah inverting voltage follower (pengikut tegangan membalik)
dapat digunakan setelah penguat penjumlah (summing Amplifier)</p><p
style="box-sizing: border-box; font-weight: 400; margin: 0px 0px 1em; text-align:
justify;"><span style="background-color: black; color: white; font-family: times; font-size:
medium;">Tegangan output pada penguat penjumlah pembalik akan terbalik dan sama
dengan jumlah aljabar pada masing-masing selisih waktu tegangan input dan tiap resistor
input maupun resistor feedback, dapat diekspresikan:</p><p style="box-sizing:
border-box; font-weight: 400; margin: 0px 0px 1em; text-align: justify;"><a

href="https://blogger.googleusercontent.com/img/a/AVvXsEhTBbemgrBHacCmVAPizTzyevlqIildIaJ-Q0oUme7dsqOqRIIzjspCKuTXij3JkNxu-dtOtGUGx72B1afECKPmaUKxwNnvLss3UHaTBbdvdyqua54qkwiKQdiCOAP2UZLrGsTu5YH-mz1WFVezvrL2dZTK8rrKtWCHicjbvYKmz_pqfa4NIDineieiRQ" style="margin-left: 1em; margin-right: 1em; text-align: center;"> atau Keterangan: n = jumlah input Bila semua nilai resistor luar sama, maka untuk semua resistor yang terpasang: Tegangan output akan diperoleh dari penjumlahan aljabaar tegangan input dengan tanda terbalik, diekspresikan dengan: Arus yang mengalir pada resistor feedback (Rf) merupakan penjumlahan dari arus yang mengalir pada seluruh tahanan input. Penguat penjumlah harus mempunyai resistor feedback (Rf) yang lebih besar dari resistor inputnya. Skala penjumlahan akan dibedakan oleh nilai resistor inputnya, sehingga tegangan input akan diperkuat daripada lainnya. </h3>
 <h3 style="clear: both; text-align: left;"><u style="background-color: black;">2) Voltage Subtraction/ Difference Amplifier 2 input sinyal</u></h3>   Difference Amplifier atau substacting Amplifier adalah pembanding tegangan dengan mode close loop.
 <div class="separator" style="clear: both; text-align:

center;"><a
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black; color: white; font-family: times; font-size: medium;">
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both; text-align: center;"><a
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black; color: white; font-family: times; font-size: medium;">
 <div
class="separator" style="clear: both; text-align: center;"><span style="background-color:
black; color: white; font-family: times; font-size: medium;">
 <div
class="separator" style="clear: both; text-align: center;"><span style="background-color:
black; color: white; font-family: times; font-size: medium;"><p style="box-sizing: border-box;
margin: 0px 0px 1em; text-align: justify;">Tanda minus pertama dalam rumus sebagai
indikator bahwa polaritas output sama pada komparator. Bila tegangan pada input inverting
lebih positif daripada tegangan pada input non inverting tegangan output akan menjadi (-),
keadaan akan terjadi sebaliknya jika tegangan inverting lebih kecil dari tegangan non
inverting.</p><p style="box-sizing: border-box; margin: 0px 0px 1em; text-align:
justify;">Penguat Differensiator / Differensial mempunyai kemungkinan untuk berubah,
perbedaan tegangan yang kecil menjadi signal tegangan yang lebih besar. Dengan
impedansi input sangat rendah dan rangkaian tipe ini dapat diisolasi (di buffer / disangga)
dengan penguat pengikut tegangan (voltage follower).</p> <div
class="separator" style="clear: both; text-align: center;"><span style="background-color:
black; color: white; font-family: times; font-size: medium;">
 <div style="margin-left: 60px; text-align: justify; text-indent:
0px;"> <h3 style="clear: both;
text-align: left;"><u style="background-color:
black;">3) Voltage Subtraction/ Difference
Amplifier</u></h3> <div style="margin-left: 60px; text-align:
justify; text-indent: 0px;"> <div

class="separator" style="clear: both; text-align: justify;">   Difference Amplifier atau substacting Amplifier adalah pembanding tegangan dengan mode close loop.

 <h3 style="clear: both; text-align: left;">B. Resistor</h3> <p style="clear: both; text-align: center;"><img border="0" data-original-height="360" data-original-width="640" height="113" src="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEgiy6i9pj9GcQhIafhhhPUGZVIdxKeUGbAzt2AstOWDOmxYb-iN4lIMXeuN0vPDkRLNugBF8oJ6hbV7bjvmE61j6clgKRzYHkiIDvsvqZD_9J3sXLIceKEcoIMhjPVUB7mTPH6unpBCPq1vdaG7aBRcQzCF-GoQHbTjA6YAvH1baiJ0127CLX1OzMMB/w200-h113/WhatsApp%20Image%202022-07-05%20at%2023.48.04.jpeg" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border: 1px solid rgb(241, 241, 241);

box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px; padding: 5px; position: relative;" width="200" />
 Resistor adalah komponen Elektronika Pasif yang memiliki nilai resistansi atau hambatan tertentu yang berfungsi untuk membatasi dan mengatur arus listrik dalam suatu rangkaian Elektronika.
 <a
href="https://blogger.googleusercontent.com/img/a/AVvXsEgsw4UTQrEWkKQJuzEde1nR0VYvfSOj95E4uR_WRWPbX3AjSnY3ROxUSWwz_097jd2o4RRIvurjT28RIKqGrlEze2N89QiguSL8DTZcZ_3mpinUQYJaBI1e0v_x94-6_1OR8I0hwhZbPPiDzA-ACiSojGfisUzf-afdAj-lr5X-0qkKXHYFez8KK_Bu0w" style="margin-left: 1em; margin-right: 1em;">
<a
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<a
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<u>Cara menghitung nilai resistor:</u> Tabel warna
<a
href="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEgyk7qY2wgOeNdk_T7Ai7kjNyYwN6Jp8lov_dcJ_3epvPzBrIni5U_MUUHrKFJuXLH-Pizdq2FNDFpfQAPA3ZBI8hXTNsA_7mtOF8Vv08Vl4LzICA8jG87CWNiiGiFZ1ipp05IiHlrpjpXBaJyphmehy2QwqXVTFNvsTx

0aXugc6yIuuanlusnmirpz/s320/WhatsApp%20Image%202022-07-04%20at%2009.08.06.jpeg" style="margin-left: 1em; margin-right: 1em; text-decoration-line: none;">

 Contoh : Gelang ke 1 : Coklat = 1 Gelang ke 2 : Hitam = 0 Gelang ke 3 : Hijau   = 5 nol dibelakang angka gelang ke-2; atau kalikan 105 Gelang ke 4 : Perak = Toleransi 10% Maka nilai resistor tersebut adalah 10 * 105 = 1.000.000 Ohm atau 1 MOhm dengan toleransi 10%.
 <u>Spesifikasi</u> <u>
</u><span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border-image: initial; border-width: 1px; box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px;"><img border="0" data-original-height="535"

data-original-width="1280" height="168"
src="https://blogger.googleusercontent.com/img/b/R29vZ2xl/AVvXsEgXJGq_MzSnpnA0KGPw_Wy1tlCx-1wNnsc7X1NE4VWv8C-4A7Ux_M8f7eibpeL-EnIbXqmBJLuxXxqITkbgAz0dcmNQsSL_eDiHl6pNDlr3s4f_XXiXanw-6kZJy0c4VBEeULM2-DRRRwlmVqn98rOpKlf-_aBtSfsF9Evj7SKyAakmKhr1hIqxMUnT/w400-h168/WhatsApp%20Image%202022-07-06%20at%2004.34.45%20(1).jpeg" style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border: 1px solid rgb(241, 241, 241); box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px; padding: 5px;" width="400"
/> <h3 style="text-align: left;"><u style="background-color: black;">C. Op-Amp 741</u></h3>   Op-Amp adalah salah satu dari bentuk IC Linear yang berfungsi sebagai Penguat Sinyal listrik. Sebuah Op-Amp terdiri dari beberapa Transistor, Dioda, Resistor dan Kapasitor yang terinterkoneksi dan terintegrasi sehingga memungkinkannya untuk menghasilkan Gain (penguatan) yang tinggi pada rentang frekuensi yang luas. Dalam bahasa Indonesia, Op-Amp atau Operational Amplifier sering disebut juga dengan Penguat Operasional. <blockquote style="border: none; font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"> <a
href="https://1.bp.blogspot.com/-kw855goDfO8/YD0HYODPOJI/AAAAAAAAAaQ/eCco_3cgdW4HeDO2qhtir4yp33oq7ugtgCLcBGAsYHQ/s300/ic%2Bopamp1.JPG" style="margin-left: 1em; margin-right: 1em; text-decoration: none;"><img border="0" data-original-height="300" data-original-width="300" height="320"
src="https://1.bp.blogspot.com/-kw855goDfO8/YD0HYODPOJI/AAAAAAAAAaQ/eCco_3cgdW4HeDO2qhtir4yp33oq7ugtgCLcBGAsYHQ/w320-h320/ic%2Bopamp1.JPG"

style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border: none; box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px; padding: 5px; position: relative;" width="320" /> </blockquote>

 <u>Konfigurasi Pin 741 </u> <blockquote style="border: none; font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; margin: 0px 0px 0px 40px; padding: 0px; text-align: left;"> </blockquote>   <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border-image: initial; border-width: 1px;

box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px;"><b style="-webkit-text-stroke-width: 0px; font-family: times; font-size: large; font-style: normal; font-variant-caps: normal; font-variant-ligatures: normal; letter-spacing: normal; orphans: 2; text-align: justify; text-decoration-color: initial; text-decoration-style: initial; text-decoration-thickness: initial; text-indent: 0px; text-transform: none; white-space: normal; widows: 2; word-spacing: 0px;"><br style="font-family: "Comic Sans MS"; font-size: medium; font-weight: 400; text-align: left;" /> <u>Spesifikasi:</u> <span style="background-attachment: initial; background-clip: initial; background-image: initial; background-origin: initial; background-position: initial; background-repeat: initial; background-size: initial; border-image: initial; border-width: 1px; box-shadow: rgba(0, 0, 0, 0.1) 1px 1px 5px;">

<!-- 3.3. Soal

[Daftar]

```
</div>-->

</span></div>


<div><div style="text-align: justify;"><span style="background-color: black; color: white; font-family: times; font-size: medium;"><b>3.1. Example</b><span> </span><a name="pri"></a><a href="#home">[Daftar]</a></span></div><div style="text-align: justify;"><span style="background-color: none; color: white; font-family: times; font-size: medium; line-height: 17.12px;"><b style="background-color: black;"><br /></b></span></div><div style="text-align: justify;"><span style="background-color: none; color: white; font-family: times; font-size: medium; line-height: 17.12px;"><b style="background-color: black;"><br /></b></span></div><div style="text-align: justify;"><span style="background-color: black; color: white; font-family: times; font-size: medium;"><span style="background-color: none; line-height: 17.12px;"><b>1. </b></span><span style="background-color: none; line-height: 16.478px;"><span style="font-feature-settings: normal; font-kerning: auto; font-optical-sizing: auto; font-stretch: normal; font-variant-east-asian: normal; font-variant-numeric: normal; font-variation-settings: normal; line-height: normal;"><span face="&quot;Calibri Light&quot;, sans-serif">Hitung tegangan keluaran untuk rangkaian dibawah ini. Dengan inputan V1 = 50 mV sin(1000t) dan V2 = 10 mV sin(3000t)</span></span></span></span></div><div style="margin-left: 20px; text-align: justify;"><div class="separator" style="clear: both; text-align: left;"><span><span face="Roboto, sans-serif" style="background-color: none; line-height: 16.478px;"><span style="font-feature-settings: normal; font-kerning: auto; font-optical-sizing: auto; font-stretch: normal; font-variant-east-asian: normal; font-variant-numeric: normal; font-variation-settings: normal; line-height: normal;"><span style="background-color: black; color: white; font-family: times; font-size: medium;"><div class="separator" style="clear: both; text-align: center;"><a href="https://blogger.googleusercontent.com/img/a/AVvXsEhiiYbrM8xVlTFJwNBuZmcpkPj4CFIuOVOAylq3tfRXi11LPRjGwYOAI_uv5_uAcIkcol6D1dgiz6LNO1YdTJd5BFLFCkQrEdi1okwaemouEhDDXr9yx0Vp5R3Rnlpn1wak8r72s7mOCnvlfOnAYZwPjJa12o_jUatX3d4EwFXfa3dYuPyf148EcLjMXQ" style="margin-left: 1em; margin-right: 1em;"><img alt="" data-original-height="763" data-original-width="1166" height="209" src="https://blogger.googleusercontent.com/img/a/AVvXsEhiiYbrM8xVlTFJwNBuZmcpkPj4CFIuOVOAylq3tfRXi11LPRjGwYOAI_uv5_uAcIkcol6D1dgiz6LNO1YdTJd5BFLFCkQrEdi1okwaemouEhDDXr9yx0Vp5R3Rnlpn1wak8r72s7mOCnvlfOnAYZwPjJa12o_jUatX3d4EwFXfa3dYuPyf148EcLjMXQ" width="320" /></a></div><div class="separator" style="clear: both; text-align: left;"><div style="text-align: justify;"><b>Solusi</b></div><span face="&quot;Calibri Light&quot;, &quot;sans-serif&quot;" style="line-height: 17.12px;"></span><p class="MsoListParagraph" style="text-align: justify;"><span face="&quot;Calibri Light&quot;, &quot;sans-serif&quot;" style="line-height: 17.12px;">Tegangan keluaran yang dihasilkan dapat dinyatakan sebagai</span></p><div class="separator" style="clear: both; text-align: justify;"><a href="https://blogger.googleusercontent.com/img/a/AVvXsEgZoANBaDAnP1BM6ThInN8Ju1y3uIHIx7JdMaiWfG0qFMXMXYJmL5lqKmkB-mrG9K2DpKsgwom8MbhzBM4XmE1Bmb3M8yixOh-gsMI7jt1OD-2T3i4S-oto7zxsbffJ-oHqyteDhtXOLG1jn2W_ElSl6vkj07dbiCVKFAwvT8_LpMnTFmjHfBe-kXZ1WQ" style="margin-left: 1em; margin-right: 1em;"><img alt="" data-original-height="295" data-original-width="1199" height="79"
```

src="https://blogger.googleusercontent.com/img/a/AVvXsEgZoANBaDAnP1BM6ThInN8Ju1y3uIHIx7JdMaiWfG0qFMXMXYJmL5lqKmkB-mrG9K2DpKsgwom8MbhzBM4XmE1Bmb3M8yixOh-gsMI7jt1OD-2T3i4S-oto7zxsbffJ-oHqyteDhtXOLG1jn2W_ElSl6vkj07dbiCVKFAwvT8_LpMnTFmjHfBe-kXZ1WQ" width="320" />
  2. Tentukan output untuk rangkaian Gambar 15.10 dengan komponen Rf 1 MΩ, R1 100 kΩ, R2 50 kΩ, dan R3 500 kΩ.   solusi
  Outputnya terlihat sebagai perbedaan V2 dan V1 dikalikan dengan faktor penguatan 20.

3.2 Problem [Daftar]
 1. Hitung tegangan keluaran untuk rangkaian Gambar. 15.51 dengan masukan V1 = 40 mV rms dan V2 = 20 mV rms.   Solusi :
 2.   Tentukan tegangan keluaran untuk rangkaian Gambar 15.53. <img alt="" data-original-height="239" data-original-width="471" height="229" src="https://blogger.googleusercontent.com/img/a/AVvXsEg0srYGzVAQn5fnXMjmbgh_LYvb

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sK-LGZErhvUjyNUWo2drFrrg01d9YNcYmUCS6V8CU_A5Fn-rY5nBDZRxvHLY4xmB83bsZ3
01-Dah4QxZY8fSbCNE8bQ=w453-h229" width="453" /> <div style="text-align:
justify;">
 <span
style="white-space: pre-wrap;">

 Solusi <div class="separator"
style="clear: both; text-align: justify; white-space: pre-wrap;"><a
href="https://blogger.googleusercontent.com/img/a/AVvXsEhKio_iCKel8wnGefMBJoc03MFN
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TSzJXybYGqEVV6aW8U3csiPRp_jvjtnnCT9m0EYsK47v5ZMaIId6fmIru3l-G_QrNFIdEUxliG
v_aXrwi62cr0P2YRPtA" style="margin-left: 1em; margin-right: 1em;"><img alt=""
data-original-height="278" data-original-width="320" height="240"
src="https://blogger.googleusercontent.com/img/a/AVvXsEhKio_iCKel8wnGefMBJoc03MFN
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TSzJXybYGqEVV6aW8U3csiPRp_jvjtnnCT9m0EYsK47v5ZMaIId6fmIru3l-G_QrNFIdEUxliG
v_aXrwi62cr0P2YRPtA" width="276" /> <span
style="white-space: pre-wrap;">

 <div style="margin-left: 25px;
text-align: justify; text-indent: 30pt;"><span style="background-color: black; color: white;
font-family: times; font-size: medium;"><div class="separator" style="clear: both; text-align:
justify;">

<span style="background-color: black; color: white; font-family: times; font-size:
medium;">

<span style="background-color: black; color:
white; font-family: times; font-size: medium;">3.3 Pilihan
Ganda <a
href="#home">[Daftar] <span
style="background-color: black; color: white; font-family: times; font-size: medium;">
 <span style="background-color: black; color:
white; font-family: times; font-size: medium;">1. Tentukan Tegangan output dari rangkaian
berikut : <span
style="background-color: black; color: white; font-family: times; font-size: medium;">
 <div
class="separator" style="clear: both; text-align: justify;"><a
href="https://blogger.googleusercontent.com/img/a/AVvXsEgqh34XiGMf36JPQDoZ9LQr9rw
o6ANpeThPGfTwSXcQMkZOc3CFgKMKosSZuQqnWVXjwGI2T6Dsr2mD33ck5MvaaCokPI
L7gO6kHSJKkzBwoHLIyOLpuy48hZpYRXNLvqVeDDJBxez7FZe1oHQlpKbSn74gVU1Fht-t

SBZuQ0dgPOh5teIzLKnm3kWvPw" style="margin-left: 1em; margin-right: 1em;"><span
style="background-color: black; color: white; font-family: times; font-size: medium;"><img
alt="" data-original-height="433" data-original-width="486" height="437"
src="https://blogger.googleusercontent.com/img/a/AVvXsEgqh34XiGMf36JPQDoZ9LQr9rwo
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7gO6kHSJKkzBwoHLIyOLpuy48hZpYRXNLvqVeDDJBxez7FZe1oHQlpKbSn74gVU1Fht-tS
BZuQ0dgPOh5teIzLKnm3kWvPw=w490-h437" width="490" /> <div
class="separator" style="clear: both; text-align: justify;"><span style="background-color:
black; color: white; font-family: times; font-size: medium;">2. Tentukan tegangan keluaran
untuk rangkaian gambar dibawah <div class="separator" style="clear: both;
text-align: justify;"><span style="background-color: black; color: white; font-family: times;
font-size: medium;">
 <div class="separator" style="clear: both; text-align:
justify;"><a
href="https://blogger.googleusercontent.com/img/a/AVvXsEgAB74Wbg_c9ufz-PgWjJ9SKcJH
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DBoa-qyE9PwmX1w" style="margin-left: 1em; margin-right: 1em;"><span
style="background-color: black; color: white; font-family: times; font-size: medium;"><img
alt="" data-original-height="408" data-original-width="523" height="444"
src="https://blogger.googleusercontent.com/img/a/AVvXsEgAB74Wbg_c9ufz-PgWjJ9SKcJH
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N3JqNIRAlrBKn1o8Jj5kuF1I1afcw4f66SO3-ay1GCWRrCd813OhcY-AYyoRs-FiDGANZiRI1_
DBoa-qyE9PwmX1w=w570-h444" width="570" /> <span
style="background-color: black; color: white; font-family: times; font-size: medium;"><div
style="text-align: justify;">

 <div
style="text-align: justify;">

<h3 style="text-align: justify;"><span style="background-color: black; color: white;
font-family: times; font-size: large;">   4.
Percobaan <a
href="#home">[Daftar]</h3> <div
class="separator" style="clear: both; text-align: center;"><h3 style="clear: both; text-align:
left;"><u>A. Prosedur
Percobaan</u></h3> <div
class="separator" style="clear: both; text-align: center;"><div class="separator" style="clear:
both; text-align: left;"><span style="background-color: black; color: white; font-family: times;
font-size: medium;">
 <div class="separator" style="clear: both; text-align:
left;"><blockquote style="border: none; margin: 0px 0px 0px 40px; padding:
0px;"> <span style="background-color: black; color:
white; font-family: times; font-size: medium;">Pada percobaan kali ini dilakukan dengan
prosedur sebagai
berikut: </blockquote> <div
style="margin-left: 20px;"> <div
class="separator" style="clear: both; text-align: left;"><ol style="text-align: left;"><li
style="margin: 0px 0px 0.25em; padding: 0px;"><span style="background-color: black; color:
white; font-family: times; font-size: medium;">Mempersiapkan Alat dan Bahan seperti yang

telah tertera pada Sub Bab Alat dan Bahan di atas
<li style="margin: 0px 0px 0.25em; padding: 0px;">Merangkai Rangkaian sesuai dengan jenisnya masing-masing dan sesuai dengan gambar
<li style="margin: 0px 0px 0.25em; padding: 0px;">Amatilah nilai input dan output dengan menyesuaikannya dengan rumus yang ada
<li style="margin: 0px 0px 0.25em; padding: 0px;">Amatilah respon grafik sinyal input dan outputnya. <u>B. Rangkaian Simulasi dan Prinsip Kerja</u> <u>
</u> <h3 style="clear: both; text-align: left;"><u>1) Summing amplifier (Penguat Penjumlah)</u></h3>

 <p style="clear: both; text-align: justify;">Pertama V input (V1 = 5 V, V2 = 5 V, dan V3 = 5 V) akan diumpankan ke resistor R1, R2, dan R3 dan masuk ke kaki inverting. Pada Op Amp terjadi penguatan, dengan perhitungan V outnya
<a href="https://blogger.googleusercontent.com/img/a/AVvXsEhTBbemgrBHacCmVAPizTzyevlqIildIaJ-Q0oUme7dsqOqRIIzjspCKuTXij3JkNxu-dtOtGUGx72B1afECKPmaUKxwNnvLss3UHaTBbdvdyqua54qkwiKQdiCOAP2UZLrGsTu5YH-mz1WFVezvrL2dZTK8rrKtWCHicjbvYKmz

_pqfa4NIDineieiRQ" style="margin-left: 1em; margin-right: 1em; text-align: center;">
Masukkan nilai Rf, R1, R2, R3, V1, V2, dan V3 ke dalam rumus sehingga Vo = -(10k/10k 5V + 10k/10k 5V + 10k/10k 5V) = -15 V. Tanda negatif disini menandakan bahwa terjadi pembalikan phasa dikarenakan input masuk kekaki inverting. Maka dapat disimpulan Op Amp melakukan penguatan sebesar 15 V dengan berbalik phasa.
 <h3 style="clear: both; text-align: left;"> <div style="-webkit-text-stroke-width: 0px; font-family: "Times New Roman"; font-size: medium; font-style: normal; font-variant-caps: normal; font-variant-ligatures: normal; font-weight: 400; letter-spacing: normal; margin-left: 20px; orphans: 2; text-align: left; text-decoration-color: initial; text-decoration-style: initial; text-decoration-thickness: initial; text-indent: 0px; text-transform: none; white-space: normal; widows: 2; word-spacing: 0px;"> <div style="-webkit-text-stroke-width: 0px; font-family: "Times New Roman"; font-style: normal; font-variant-caps: normal; font-variant-ligatures: normal; font-weight: 400; letter-spacing: normal; margin-left: 20px; orphans: 2; text-align: left; text-decoration-color: initial; text-decoration-style: initial; text-decoration-thickness: initial; text-indent: 0px; text-transform: none; white-space: normal; widows: 2; word-spacing: 0px;"> Pertama V input akan diumpankan ke resistor d<span

style="font-family: times;">engan inputan V1 = 50 mV sin(1000t) dan V2 = 10 mV sin(3000t) dan masuk ke kaki inverting. Pada Op Amp terjadi penguatan, dengan perhitungan V out = - (Rf/R1 V1 + Rf/R2 V2) <a
href="https://blogger.googleusercontent.com/img/a/AVvXsEgZoANBaDAnP1BM6ThInN8Ju1y3uIHIx7JdMaiWfG0qFMXMXYJmL5lqKmkB-mrG9K2DpKsgwom8MbhzBM4XmE1Bmb3M8yixOh-gsMI7jt1OD-2T3i4S-oto7zxsbffJ-oHqyteDhtXOLG1jn2W_ElSl6vkj07dbiCVKFAwvT8_LpMnTFmjHfBe-kXZ1WQ" style="font-family: times; font-size: large; margin-left: 1em; margin-right: 1em;"><img alt="" data-original-height="295" data-original-width="1199" height="99"
src="https://blogger.googleusercontent.com/img/a/AVvXsEgZoANBaDAnP1BM6ThInN8Ju1y3uIHIx7JdMaiWfG0qFMXMXYJmL5lqKmkB-mrG9K2DpKsgwom8MbhzBM4XmE1Bmb3M8yixOh-gsMI7jt1OD-2T3i4S-oto7zxsbffJ-oHqyteDhtXOLG1jn2W_ElSl6vkj07dbiCVKFAwvT8_LpMnTFmjHfBe-kXZ1WQ=w400-h99" width="400" /> Tanda negatif disini menandakan bahwa terjadi pembalikan phasa dikarenakan input masuk kekaki i <a
href="https://blogger.googleusercontent.com/img/a/AVvXsEiKGSpw3R2xvngaSjVgol77jjKEMMa39bEj2p2kZdSTjh_iPOeJOV5VIHHc8K879hO78zG3Bsb_la7DI_G1ZbZaZ0NK0jIEpb3kCq1AqDpz5rVWZ06pDww0pyfJ5E-V8oVBrecatD2fwcTvopex9ElsvUbTckVn166hj9WYWhEc8a5VVZDxI4etxjccsg" style="margin-left: 1em; margin-right: 1em;"><img alt="" data-original-height="615" data-original-width="719" height="342"
src="https://blogger.googleusercontent.com/img/a/AVvXsEiKGSpw3R2xvngaSjVgol77jjKEMMa39bEj2p2kZdSTjh_iPOeJOV5VIHHc8K879hO78zG3Bsb_la7DI_G1ZbZaZ0NK0jIEpb3kCq1AqDpz5rVWZ06pDww0pyfJ5E-V8oVBrecatD2fwcTvopex9ElsvUbTckVn166hj9WYWhEc8a5VVZDxI4etxjccsg=w400-h342" width="400" />

 Pertama V1 dan V2 diumpankan ke resistor dengan nilai V1 = 40 mV rms dan V2 = 20 mV rms. Kemudian masuk ke kaki inverting dan terjadi penguatan dengan Vout
 <a
href="https://blogger.googleusercontent.com/img/a/AVvXsEhE5_cmGUktStV5wHQ8zoTU0iTp_f9ouBxEwlnuhQEIenPdJNj0TlSsfc0EZcpLfxYj2JWXTrpvcFpYlaRlrA0iEuUNlPgEABl-88cr3n8s0f0wpdTvEuIUVsmBNspcYG8zB0YpXO6ZoLkJuZ8iX9g4cd-urqZ76xgFADT4fzudC8EK0TEuYcEYydUzJg" style="font-family: times; font-size: large; margin-left: 1em; margin-right: 1em; text-align: center;"><img alt="" data-original-height="349" data-original-width="1542" height="116"
src="https://blogger.googleusercontent.com/img/a/AVvXsEhE5_cmGUktStV5wHQ8zoTU0iTp_f9ouBxEwlnuhQEIenPdJNj0TlSsfc0EZcpLfxYj2JWXTrpvcFpYlaRlrA0iEuUNlPgEABl-88cr3n8s0f0wpdTvEuIUVsmBNspcYG8zB0YpXO6ZoLkJuZ8iX9g4cd-urqZ76xgFADT4fzudC8EK0TEuYcEYydUzJg=w518-h116" width="518" />
 <span style="font-family:

"Times New Roman"; font-size: medium; text-align: left;">Maka dapat disimulan Vo Rms nya sebesar -1.18 V. Pada penguatan kali ini terjadi pembalikan phasa.nverting. </p> <u style="background-color: black;">2) Voltage Subtraction/ Difference Amplifier</u></h3>

 Pertama V1 dan V2 diumpankan ke resistor dengan nilai V1 = 5 V dan V2 = 5 V. Kemudian masuk ke kaki inverting dan terjadi penguatan dengan Vout

 Vo = [10k/(10k+10k)][(5k+2k)/5k 5V - 2k/5k 5V] Vo = + 1,5 V
 Terlihat pada voltmeter pada kaki

output sebesar + 1,5 V (Sesuai dengan perhitungan).

 Pertama V1 dan V2 diumpankan ke resistor dengan nilai V1 = 10 V dan V2 = 5 V. Kemudian masuk ke kaki inverting dan terjadi penguatan dengan Vout

     <div class="separator"

style="clear: both; text-align: left;">Maka V1-V2 = 10 V - 5 V = 5 V. Terlihat pada voltmeter pada kaki output sebesar + 5,01 V (mendekati dengan perhitungan).

 <h3 style="clear: both; text-align: left;"><u style="background-color: black;">3) Voltage Subtraction/ Difference Amplifier 2 input sinyal</u></h3>

 Pertama V input satu (V1) diumpankan ke resistor kemudian masuk ke kaki inverting diperkuat oleh op amp pertama. V out hasil penguatan op amp pertama diumpankan keresistor dan masuk ke kaki inverting op amp kedua dan diperkuat kembali sehingga untuk nilai V outnya

 Vout = -(10k/10k V2- 10k/10k 10k/10k V1) Vout = -(V2-V1) Vout =

V1-V2
 Dengan V1 rms = 5 V dan V2 rms = 5 V sehingga didapatkan nilai Vout = 5 V- 5V = 0 (Seperti ditunjukan oleh voltmeter)

 Pertama V input satu (V1) diumpankan ke resistor kemudian masuk ke kaki inverting diperkuat oleh op amp pertama. V out hasil penguatan op amp pertama diumpankan ke resistor dan masuk ke kaki inverting op amp kedua dan diperkuat kembali sehingga untuk nilai V outnya

 <div class="separator" style="clear: both;

text-align: left;">Dengan V1 rms = 6 V dan V2 rms = 5 V sehingga didapatkan nilai Vout = -20 (v2-v1) = -20 . -1 = 20 V. Maka dapat disimpulkan untuk hasil dari dua penguatan op amp diatas menghasilkan nilai v output akhir sebesar 20 V

 Pertama V input satu (V1) diumpankan ke resistor kemudian masuk ke kaki inverting diperkuat oleh op amp pertama. V out hasil penguatan op amp pertama diumpankan ke resistor dan masuk ke kaki inverting op amp kedua dan diperkuat kembali sehingga untuk nilai V outnya

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 <div class="separator" style="clear: both;
text-align: left;">Dengan V1 rms = 12 V dan V2 rms = 18 V sehingga didapatkan nilai Vout
=1,02 V Maka dapat disimpulkan untuk hasil dari dua penguatan op amp diatas
menghasilkan nilai v output akhir sebesar 1,02 V
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style="clear: both; text-align: center;">
 <div class="separator" style="clear: both;
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input satu (V1) diumpankan ke resistor kemudian masuk ke kaki inverting diperkuat oleh op
amp pertama. V out hasil penguatan op amp pertama diumpankan ke resistor dan masuk ke
kaki inverting op amp kedua dan diperkuat kembali sehingga untuk nilai V
outnya
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left;">Vo = - (470k/47k 18V - 470k/47k 330k/33k 12V) <div class="separator"
style="clear: both; text-align: left;">Vo = -1,02 V
 <div class="separator"
style="clear: both; text-align: left;">Dengan V1 rms = 12 V dan V2 rms = 18 V sehingga
didapatkan nilai Vout =1,02 V Maka dapat disimpulkan untuk hasil dari dua penguatan op
amp diatas menghasilkan nilai v output akhir sebesar 1,02 V
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<span
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 <h3 style="text-align: justify;">   5. Link Download [Daftar]</h3>   Download HTML Klik disini..   Download Rangkaian Teori 15.8 Klik disini..

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