ELECTRONIC CIRCUIT

1st Edition

TIPS & TRICKS QUESTION

- LATIFAH AZIZ
- TS KHAIROL ADHA AHMAD
- NUWAIRANI AZURAWATI SIHA

ELECTRONIC CIRCUIT

TIPS & TRICS QUESTION

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Electronic Circuit Question Bank Stratergies & Scheme

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Preface

"This E-book is written and compiled to provide formative reinforcement exercises to students and to teach them on how to answer question with tips and trics. The questions developed are tailored to the appropriate level of the students, especially those in polytechnics. The book is written in a clear and easy-to-understand style, presenting questions according to the outlined guidelines along with complete answer schemes."

Latifah Abdul Aziz

Foreword

In the Name of Allah, the All-beneficent, the All-merciful

Thank you to **Allah**, the Most Gracious and Most Merciful, who has bestowed His blessings and love, enabling the author to complete the Ebook titled "Tips & Trics Question" The author also expresses gratitude to all parties involved, directly or indirectly, who have contributed ideas in the process of preparing this Ebook. The author hopes to assist students in practicing effective question-answering techniques and following the correct marking scheme. This Ebook also provides links to enable students to access notes and additional formative questions, allowing them to master each topic effectively. The author believes that through gradual and consistent learning, students will be able to enhance their understanding and performance in the electronic circuit subject. The author hopes that this Ebook can be a loyal companion in the learning journey of the students.

About the author

Latifah Abdul Aziz, an experienced writer for nearly 17 years, currently serves as a lecturer at Mukah Polytechnic, Sarawak. She holds a Bachelor's degree in Electrical Engineering and a Master's degree in Technical and Vocational education. Her experience and knowledge in this field have enabled her to make significant contributions to the writing industry. She hopes that this ebook will benefit readers, especially higher education students, in enhancing their understanding of each topic taught.

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Ts Khairol Adha Ahmad, an experienced writer for nearly 17 years, currently serving as a lecturer at Mukah Polytechnic, Sarawak. He holds a Diploma in Electrical Engineering, a Bachelor's degree in Electrical Engineering (Control), and a Master's degree in Technical and Vocational Education. His experience and knowledge in this field have enabled him to make significant contributions to the writing industry. He hopes that this ebook will assist higher education students in strengthening their understanding with practice examples along with provided answers.

Author 2
Ts Khairol Adha Ahmad

About the author

Nuwairani Azurawati binti Siha, an established writer with nearly 15 years of experience, currently serves as a lecturer at Mukah Polytechnic, Sarawak. Holding a Bachelor's degree in Electrical Engineering and a Master's degree in Electronic System Engineering, she has utilized her expertise to make significant impacts in the realm of writing. Additionally, she serves as a Reference Lecturer for Item Construction (PRIP) at Jabatan Pengajian Politeknik Kolej Komuniti (JPPKK). She aims for this ebook to benefit readers, particularly those in higher education, by enhancing their understanding of the covered topics.

Author 3
Nuwairani Azurawati Siha

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TOPIC 1

LINEAR DC POWER SUPPLY

UNDERSTANDING DC POWER SUPPLIES

How Does a DC Power Supply Work?

DC stands for Direct Current. Unlike alternating current (AC), which periodically changes direction, DC flows steadily in one direction. A DC power supply is a device that converts alternating current (AC) from an electrical outlet into direct current (DC). This DC output is then used to power various electronic devices and circuits.

Basics DC Power Supply

A DC power supply typically consists of a transformer, rectifier, filter, and voltage regulator. Here's a brief overview of each component's role:

Transformer

Converts the input AC voltage from the electrical outlet to a different voltage level suitable for the application.

Rectifier

Converts the alternating current (AC) into pulsating direct current (DC) by allowing current to flow in only one direction.

Filter

The filter circuit smoothens out the pulsating DC voltage by reducing the ripple or fluctuations.

Voltage regulator

Ensures that the DC output remains within a specified range, providing reliable power to connected devices

Transformer

- Step up
- Step down

Rectifier

- Half wave
- Full wave
- Bridge

Filter

- RC Filter
- LC filter
- Phi Filter

Voltage regulator

- Series Transistor
- Zener Diode
- Integrated Circuit

Voltage divider

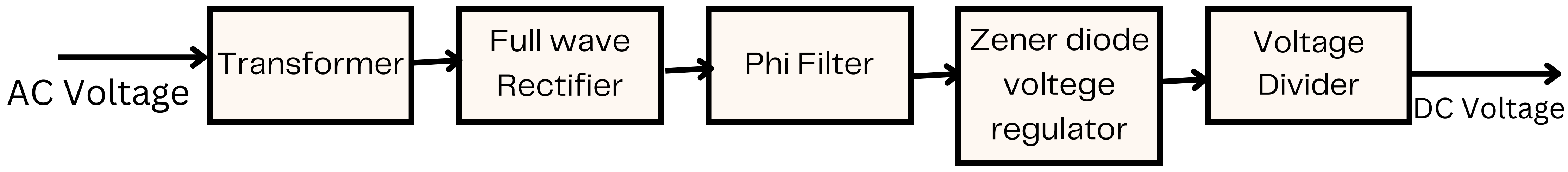
- Fix voltage divider circuit
- Variable voltage divider

DID YOU KNOW?

Understanding the operation of each block is crucial for designing, troubleshooting, and maintaining power supply systems in various electronic applications.

INTERESTING FACT

Question 1



Transfer the block diagram in Figure above into complete DC power supply circuit.

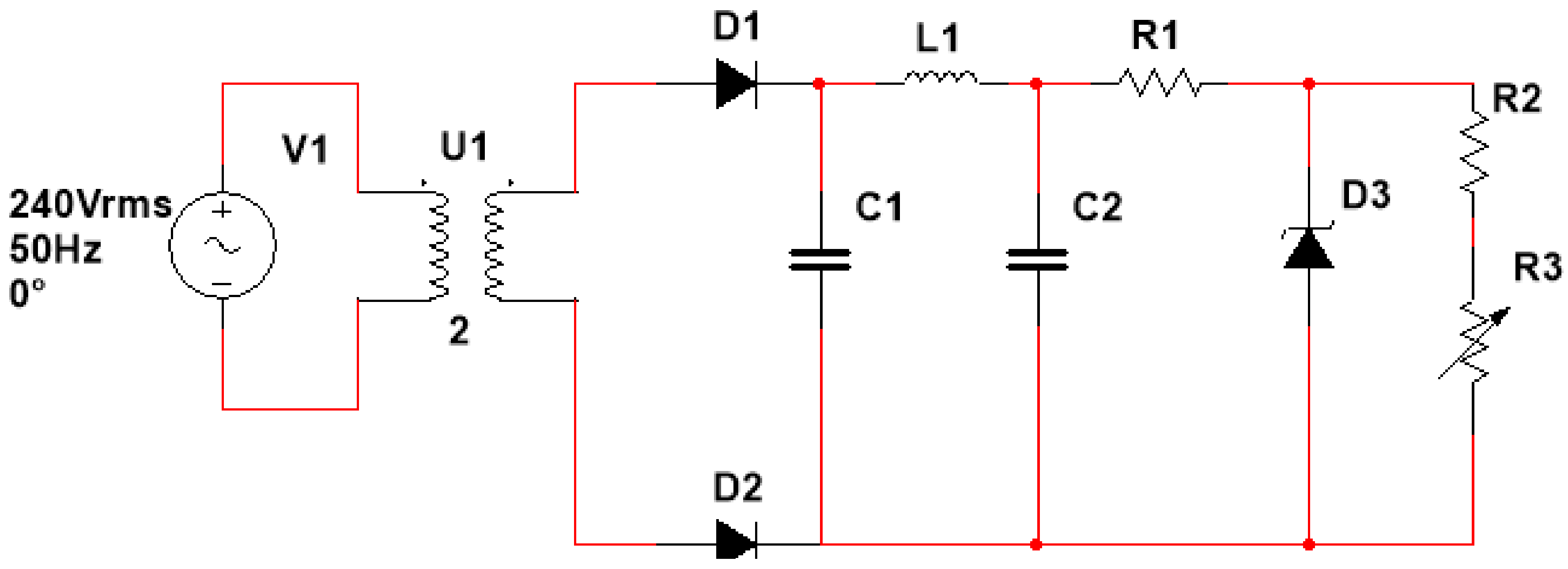
Answer

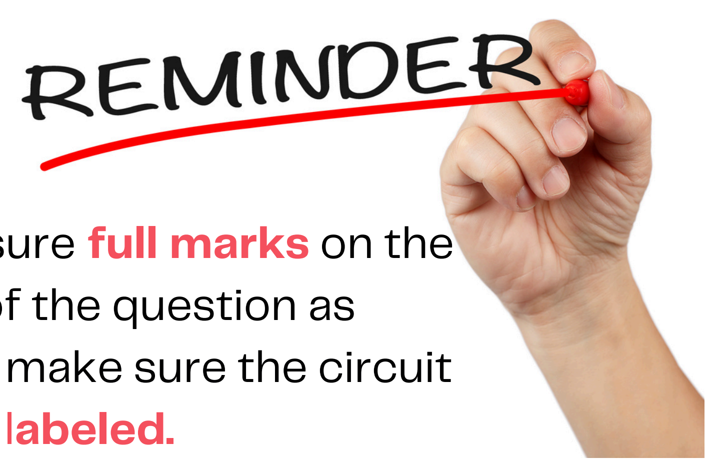
Step 1

To comprehend the components of the block diagram, start by identifying the common block in the diagram. You have the flexibility to select any suitable option. For instance, if the type of transformer is unspecified, you can opt for either step-down, step-up, or other types.

Step 2

Design the Circuit





To ensure **full marks** on the form of the question as above make sure the circuit is well **labeled.**

Question 2

Sketch a complete power supply circuit that consists of a transformer, full-wave rectifier, LC filter, Zener diode regulator, and variable resistor voltage divider. Then draw the expected input and output waveforms.

Answer

QUICK TIPS

For the answer input and output waveform questions, students often make mistakes by drawing waveforms on each component.

The real answer is that the input waveform is before entering the transformer while the output waveform is output from the voltage divider.

YOU GOT THIS!

Question 3

Explain what is meant by **"ripple voltage"** in a DC power supply?

Answer

Ripple voltage is the residual periodic variation in the DC output voltage after rectification and filtering, resulting from incomplete suppression of the AC waveform.

Attention even though this question looks short but please look at the distribution of marks, if the mark is more than 2 then you need to explain more and you can also draw the shape of the ripple wave

Question 4

Sketch a complete power supply circuit that includes transformer, bridge rectifier, phi(π) filter, Zener diode regulator and fixed resistor voltage divider. Draw expected input and output waveform.

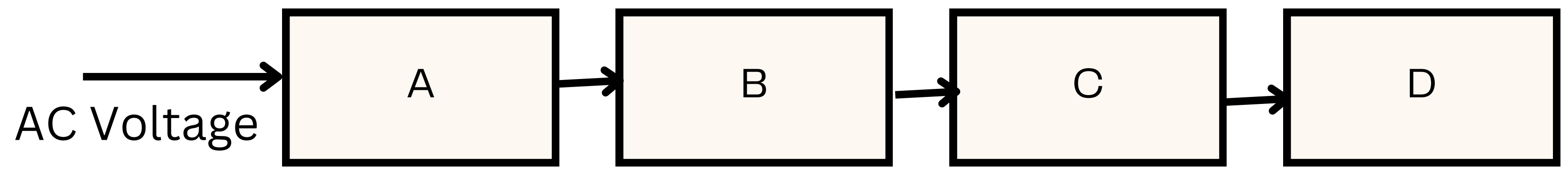
Answer

QUICK TIPS

To answer this question, students must recognize the various components involved, as each component has **different types**. Following that, students need to understand each component to illustrate the input wave before reaching the transformer and the output wave after passing through the voltage divider.

Question 6

Discuss each of the blocks in diagrams A, B, C, and D as shown.



Answer

QUICK TIPS

Students must identify the components within the power supply to address this question. Next, they should list the components and describe the function of each one. Additionally, students can sketch the output waveform for each component.

To answer the questions at example 2 the form of **discussion** it depends on the number of marks given rationale **1 description 2M.**

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TOPIC 2

OSCILLATOR

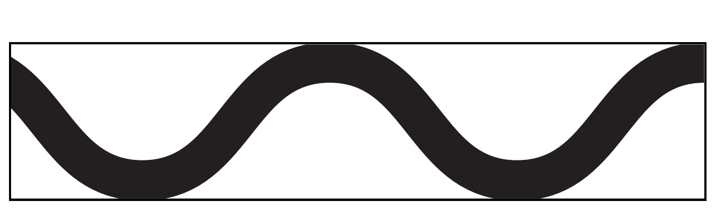
DEMYSTIFYING OSCILLATORS

What is an Oscillator

An oscillator is a device or circuit that generates repetitive signals, typically in the form of electrical waveforms, such as sine waves, square waves, or triangular waves. These signals oscillate, meaning they continuously vary between two states, creating a periodic output.

Types of Oscillators:

Sinusoidal Oscillator



Non-sinusoidal Oscillator

LC Oscillators:

- Colpitts oscillator
- Hartley oscillator
- Armstrong oscillator.

RC Oscillators:

- Phase Shift oscillator
- Wien bridge oscillator

Crystal Oscillators:

- Pierce oscillator

Question 1

Hartley oscillator is used to produce a sinewave of desired frequency. Explain the operation of Hartley Oscillator by using a suitable diagram.

Answer

1. **LC Tank Circuit:**
   - The tank circuit consists of two inductors (L1L_1L1 and L2L_2L2) and one capacitor (CCC). These components determine the frequency of the oscillation.
2. **Feedback Network:**
   - Part of the output is fed back to the input through the inductors L1L_1L1 and L2L_2L2. This feedback helps sustain the oscillations.
3. **Amplifier:**
   - The amplifier (usually a transistor) boosts the signal. This compensates for energy losses in the circuit to keep the oscillations going.
4. **Frequency of Oscillation:**
   - The frequency (fff) at which the oscillator generates the sine wave is given by the formula:

$$f = \frac{1}{2\pi\sqrt{(L_1 + L_2)C1}}$$

The word "explain" covers a wide range of meanings, including clarification, description, justification, and interpretation.

To answer this question, the form of "explain" depends on the number of marks given

Question 2

Colpitts Oscillator circuit having two capacitors of 15pF and 25pF respectively are connected in parallel with an inductor. Given that the frequency of oscillations of the circuit is 1.5MHz. Calculate the value of inductor L1, draw tank circuit of Colpitts Oscillator.

Answer

$$C_T = \frac{C_1 \times C_2}{C_1 + C_2}$$ ✓ 1M

$$C_T = \frac{15_P \times 25_P}{15_P \times 25_P}$$ ✓ 1M

$$C_T = 9.38pF$$

$$f = \frac{1}{2\pi\sqrt{LC_T}}$$ ✓ 1M

$$1.5M = \frac{1}{2\pi\sqrt{L \times 9.38_P}}$$ ✓ 1M

$$\sqrt{L \times 9.38_P} = \frac{1}{2\pi\,(1.5M)}$$

$$L \times 9.38_P = (\frac{1}{2\pi\,(1.5M)})^2$$

$$L = \frac{0.0112p}{9.38_P}$$ ✓ 1M

$$L = 1.2mH$$ ✓ 1M

To answer **calculation** questions. Students have to show the work **step by step** according to the marking scheme

Question 3

Armstrong oscillator is used to produce a sinewave of desired frequency. Explain the operation of Armstrong Oscillator by using a suitable diagram.

Answer

To answer this question you need to identify whether Armstrong is in the LC or RC group of oscillator

The **key components** of the Armstrong oscillator are:

- A tuned LC circuit, which determines the oscillation frequency.
- An amplifier (transistor or tube), which amplifies the signal.
- A feedback network, typically implemented using a transformer, which couples the output back to the input.

Question 4

Compute the value of Capacitor, C1 for the Hartley Oscillator if the oscillation frequency is 5kHz and the inductor value L1=L2=0.1mH.

Answer

QUICK TIPS

To address this question, students should understand that the Hartley oscillator circuit consists amplifier with feedback network tapped inductors (two inductors in series and a single capacitor connected in parallel to the seriel combination

As a result, the total inductance value is the combined **sum of the two inductors**. LT

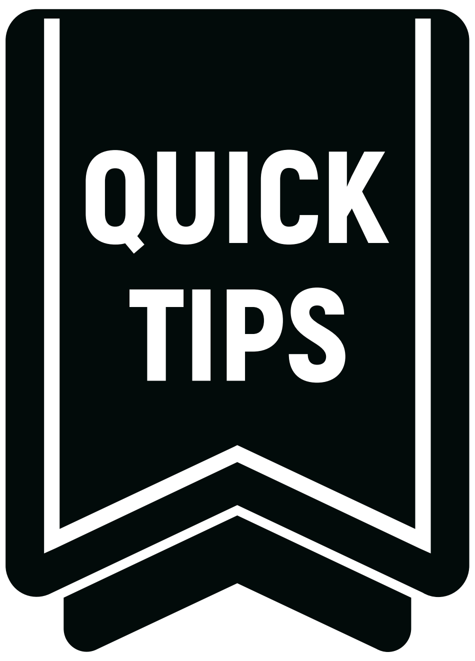
Use this formula to find the value of C

$$f = \frac{1}{2\pi\sqrt{(L_1 + L_2)C1}}$$

Question 5

The Hartley oscillator achieves positive feedback by using an inverting amplifier plus the 180° phase shift across a parallel resonant circuit. If the following components are given Rin= 4.7kΩ, RF = 10kΩ, C1=10uF, L1=L2=0.1mH, Op- amp IC 741. Calculate the oscillator frequency.

Answer



This question aims to assess the fundamental understanding of students regarding the Hartley circuit.

There are certain data points provided, such as the R value and phase shift, that are unnecessary.

Therefore students only need to use the following formula to solve this problem

$$f = \frac{1}{2\pi\sqrt{(L_1 + L_2)C1}}$$

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TOPIC 3

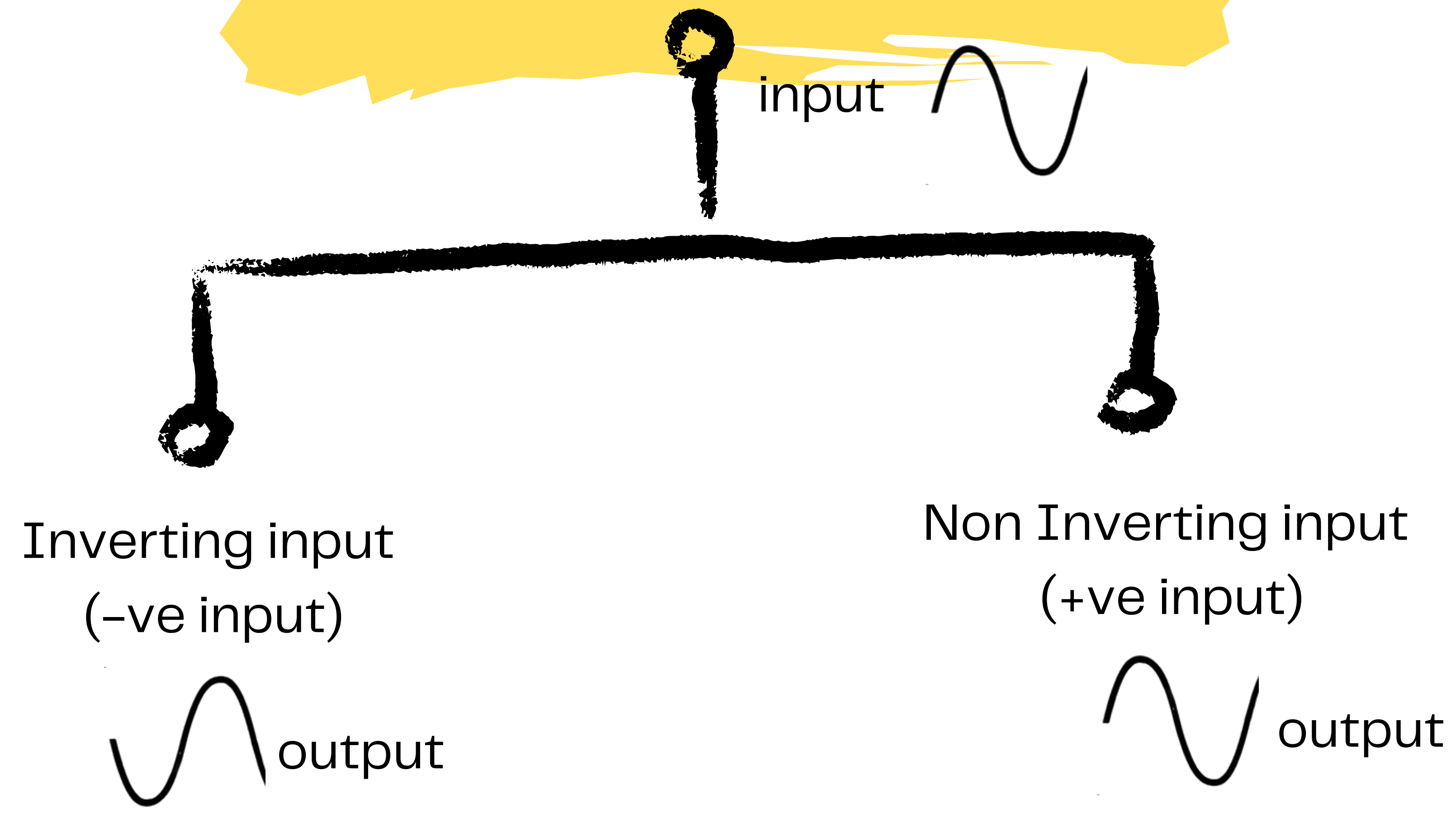
OPERATIONAL AMPLIFIER

UNVEILING THE OPERATIONAL AMPLIFIER

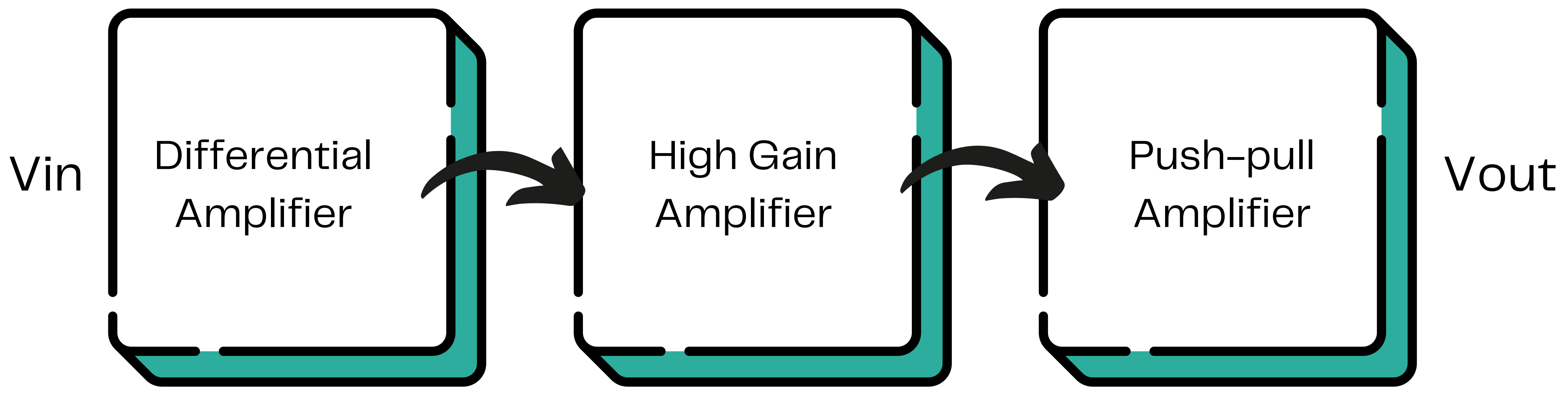
What is an Operational Amplifier?

An operational amplifier is a high-gain differential voltage amplifier with two input terminals (inverting and non-inverting), one output terminal, and typically a power supply connection. Its primary function is to amplify the voltage difference between its input terminals and produce a corresponding output voltage.

2 input terminals



Block Diagram of Op-Amp



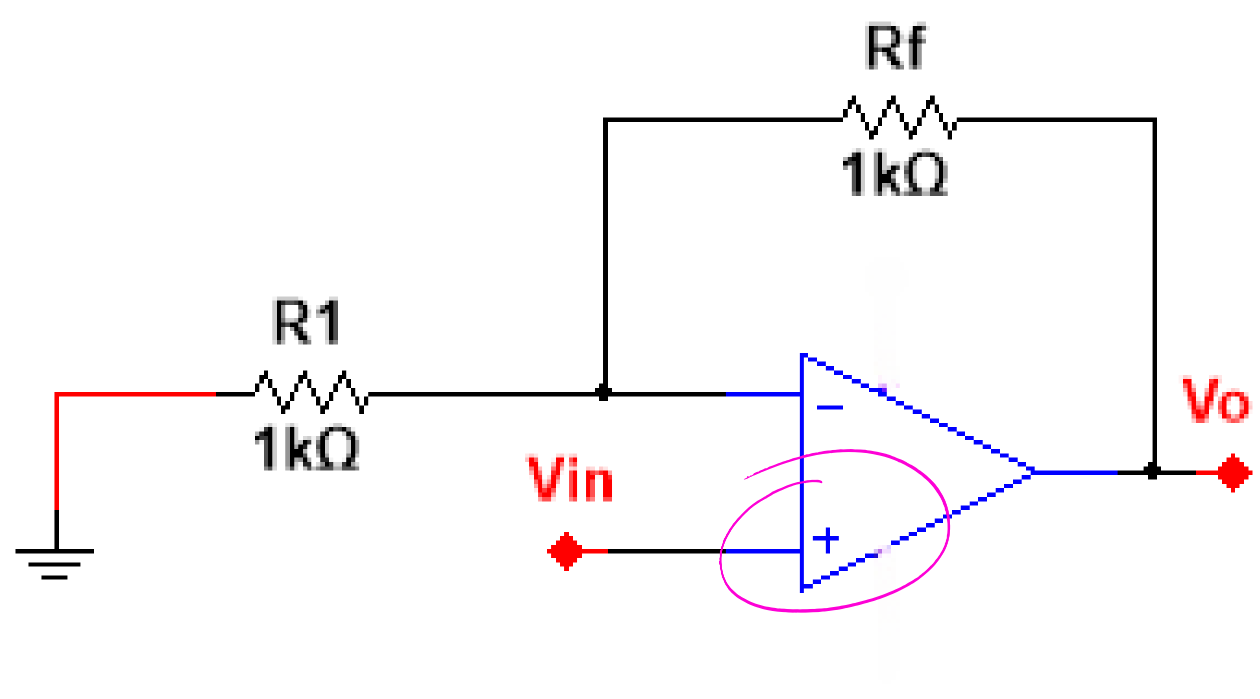


Figure 1

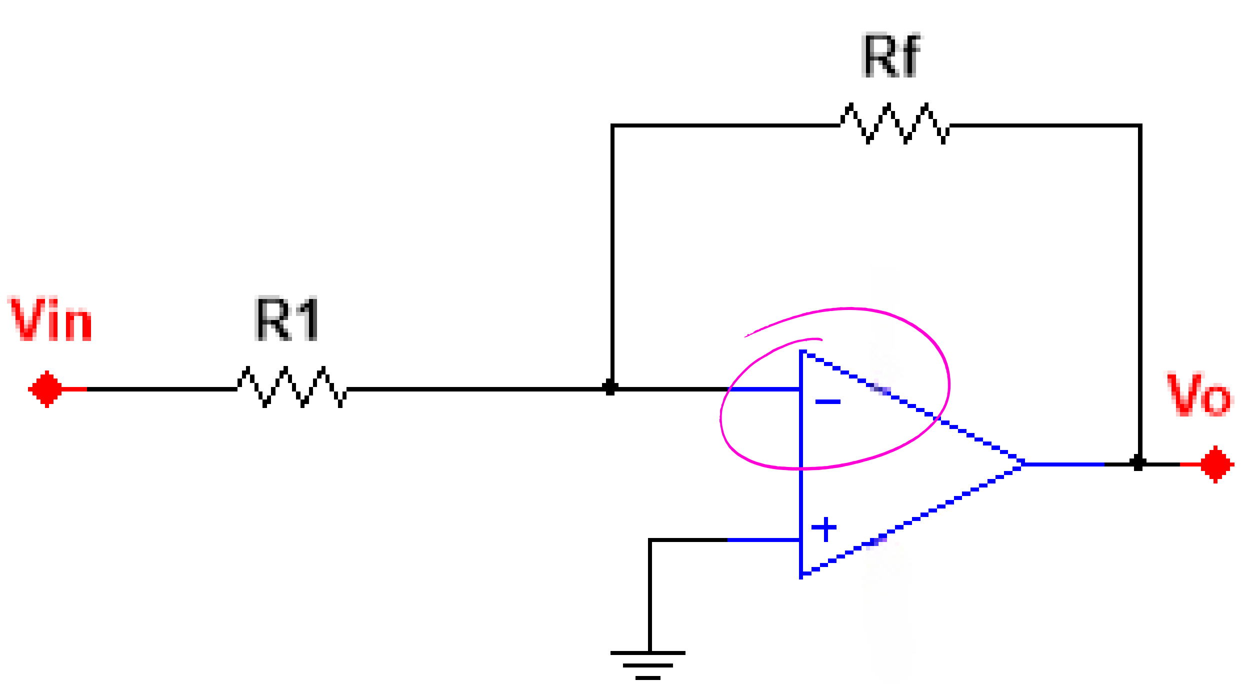
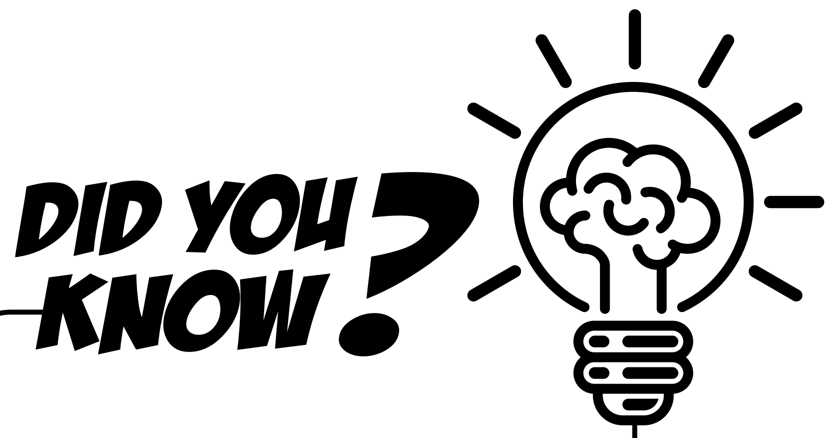
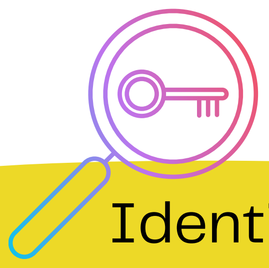


Figure 2



How would you determine the operation of an operational amplifier based on the figure?

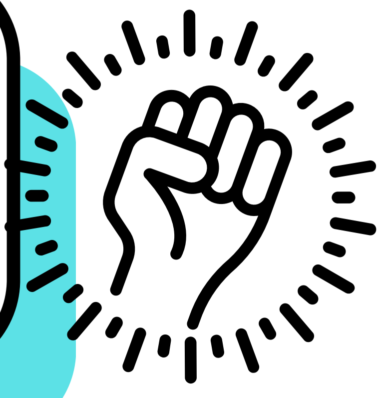
INTERESTING FACT



Identify where the signal is applied

SELF LEARNING

How the **connections to the op-amp inputs** determine whether the circuit amplifies the input signal with the same polarity (non-inverting) or with the opposite polarity (inverting).



Question 1

Operational amplifier (Op-Amp) is an integrated circuit that contains several levels and a differential amplifier configuration. Draw the block diagram of op-amp and write the function of each stages. With aid of diagram, derive the equation of Common Mode Rejection Ratio (CMRR). Referring to Figure 1, calculate the CMRR in Decibel (dB). Its common mode gain is 0.001.

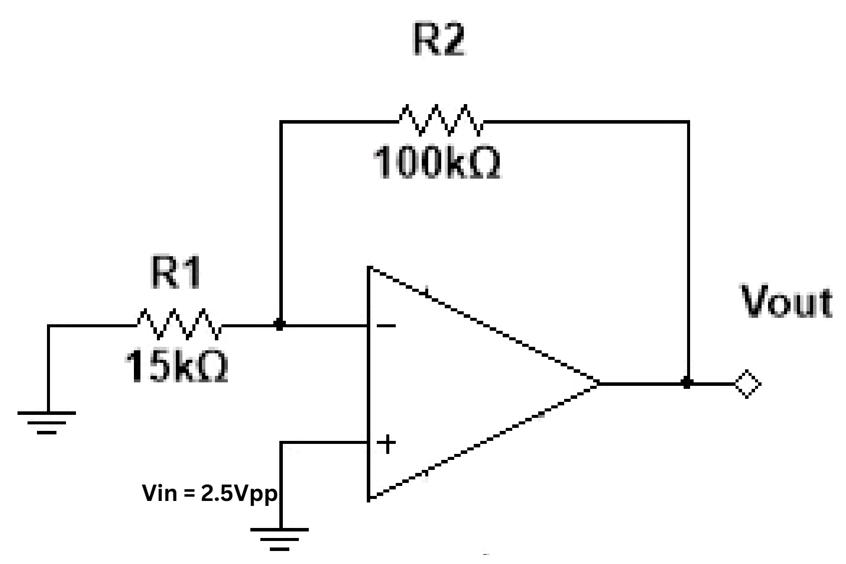


Figure 1

Answer

QUICK TIPS

First, determine whether the circuit is a non-inverting or inverting amplifier by examining the source input.

Second, calculate the differential gain Ad

Last, you can calculate the CMRR (dB) using the formula

$$\text{CMRR (dB)} = 20\log_{10}\left(\frac{A_d}{A_{cm}}\right)$$

Ad - Differential gain
Acm- Common mode gain

Question 2

If the voltage gain AV of an amplifier is 25, sketch the non-inverting amplifier circuit. Then by using voltage gain formulae, sketch an inverting amplifier system with a required gain of -25.

Answer

QUICK TIPS

For this question students need to do 2 steps

- The first step is solve the question using the non-inverting gain formula and then draw the non inverting circuit

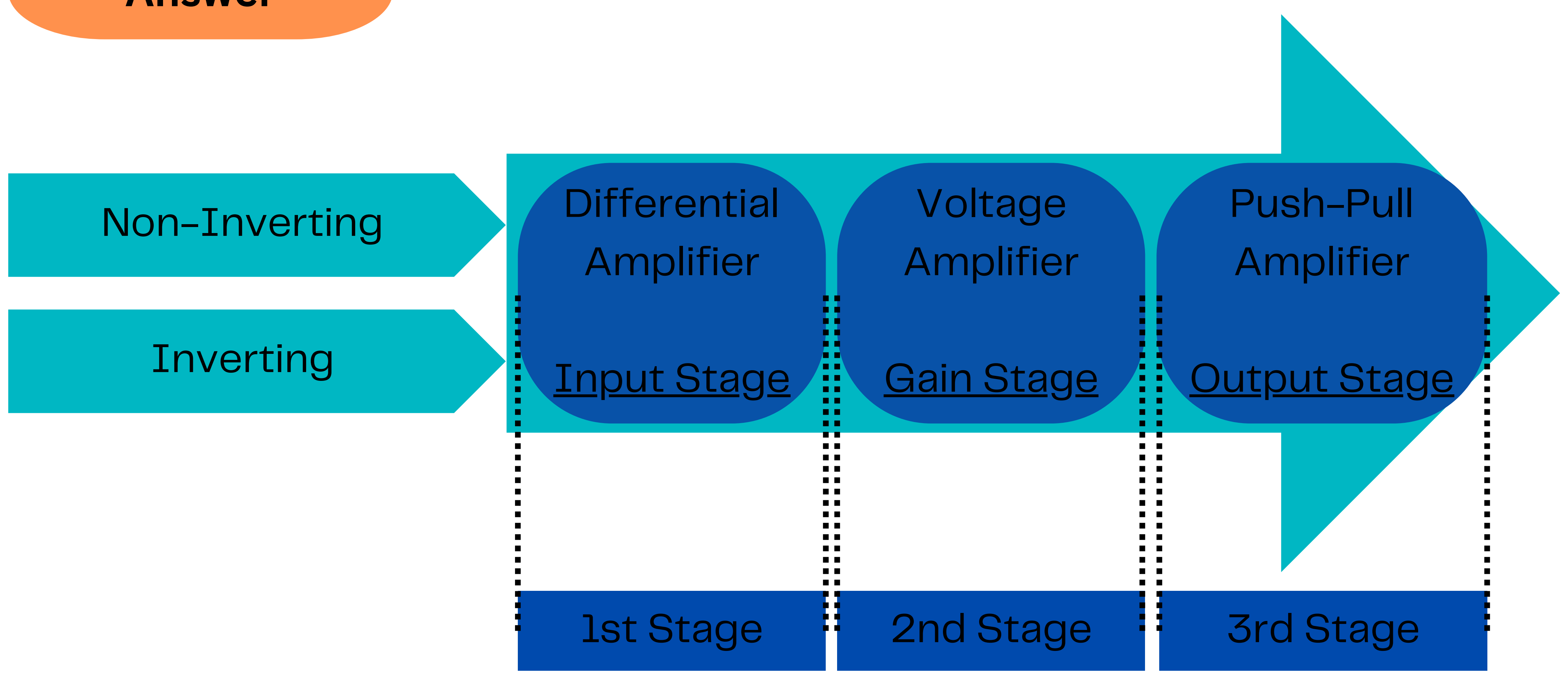
- The second step is to solve using the inverting method to find the gain and then draw the inverting circuit

The non-inverting amplifier provides a voltage gain of 25, while the inverting amplifier provides a gain of -25.

Question 3

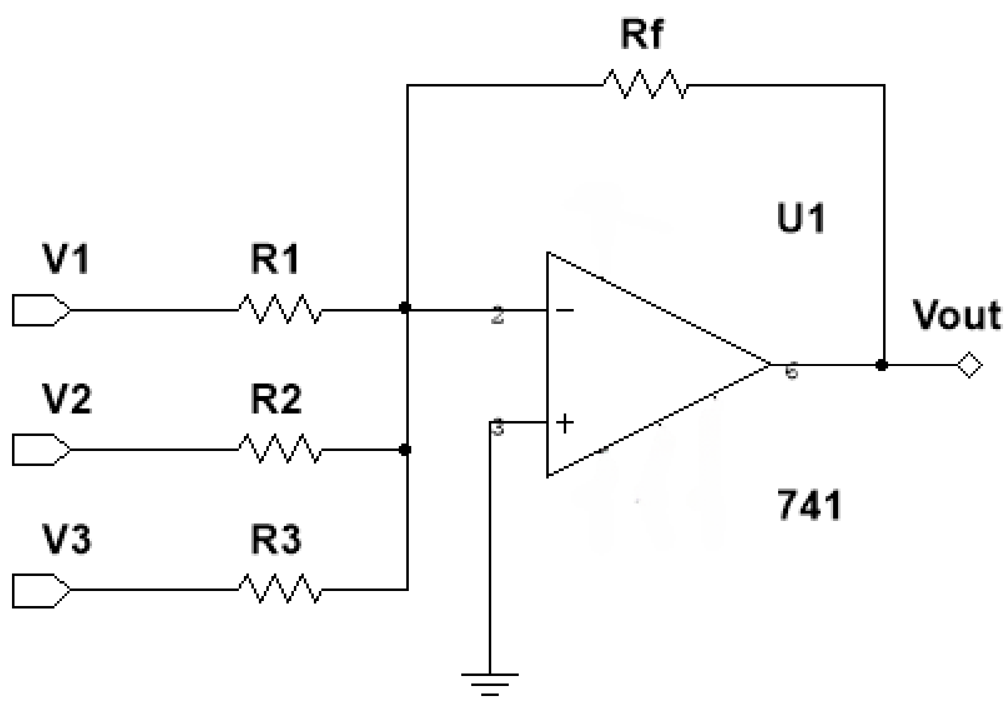
Draw and label the block diagram of an operational amplifier (op-amp).

Answer

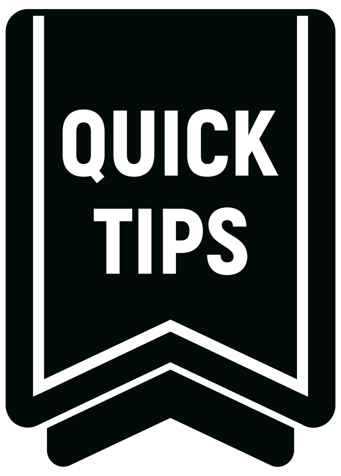


Question 4

Calculate output voltage, Vo and voltage gain, Av for summing circuit if given V1 = V2 = V3 = 2V, R1 = R2 = R3 = 3kΩ and Rf = 6kΩ



Answer



To solve this question we need to know the formula for a summing amplifier (inverting summing amplifier) with multiple input voltages.

Step 1: Calculate Output Voltage Vo

$$Vo = -(\frac{R_f}{R_1}V_1 + \frac{R_f}{R_2}V_2 + \frac{R_f}{R_3}V_3)$$

Step 2: Calculate Voltage Gain Av

$$Av = \frac{-Vo}{Vi}$$

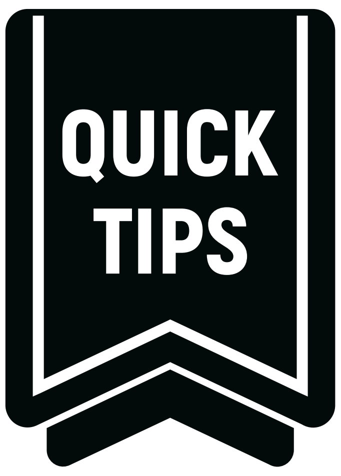
Why the answer in -ve?

This is because the circuit is in an **inverting** state

Question 5

An Inverting Summing Amplifier is an op-amp circuit that combines several input terminals and produces an output that is the weighted sum of the inputs. **Solve the output voltage** equation (Vo), the current input I1, I2 and output voltage if RF=10kΩ, R1=5kΩ and R2 = 2.5kΩ, which given input voltage V1=2V and V2=1V. Ended the answer with the **waveforms** of the input and output simultaneously and **form it into the circuit.**

Answer



Long and complex questions are typically found in **essay questions**, which make up 20 marks in total. To excel in these questions, it is important to provide **detailed explanations and solutions**, especially for calculation-based queries. Feel free to incorporate **diagrams** where appropriate to support your answers.

Furthermore, the most effective approach is to create underline of all the instructions provided.

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TOPIC 4

TIMER

DEMYSTIFYING TIMERS

What is a Timer ?

A timer is a device or circuit that measures and controls the passage of time. It generates timing signals or pulses at predetermined intervals, facilitating various functions such as counting, sequencing, and timing events within electronic systems.

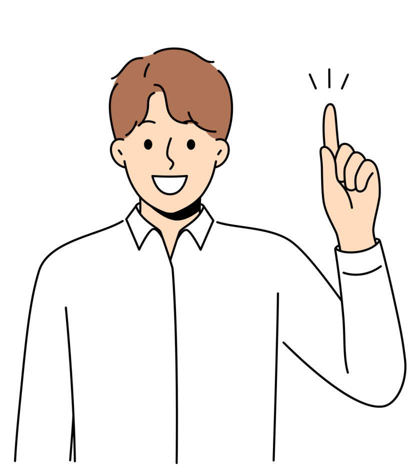
1 Monostable Mode

In one-shot mode, a timer generates a single output pulse of a set duration when triggered, which then returns to its initial state after the specified time.

2 Astable Mode

The timer generates fixed-frequency output pulses with a set duty cycle, commonly used for timing or clock signals.

Timers offer **flexibility** and **versatility** through different operating modes.



3 Bistable Mode

Flip-flop mode, known as bistable mode, allows a timer to stay in one of two stable states until triggered to switch. Commonly used in digital logic circuits for memory storage and sequential control.

Question 1

Define the differences between astable, monostable, and bistable modes of the 555 timer?

Answer

QUICK TIPS

The differences between astable, monostable, and bistable modes of the 555 timer

Astable Mode (Oscillator)

No trigger input is necessary; the output produces a steady oscillation.

Monostable Mode (One-Shot)

Activated by an external signal to produce a single pulse.

Bistable Mode (Flip-Flop)

Both states are stable, and external triggers toggle the output between high and low.

This comparison outlines how the 555 timer can be configured to generate pulses or maintain different states based on external triggers or continuous oscillation.

Question 2

By referring to Figure 4.1, sketch the waveform at pin 2, pin 3 and pin 6. Then calculate the pulse width if R = 10MΩ and C = 0.1μF

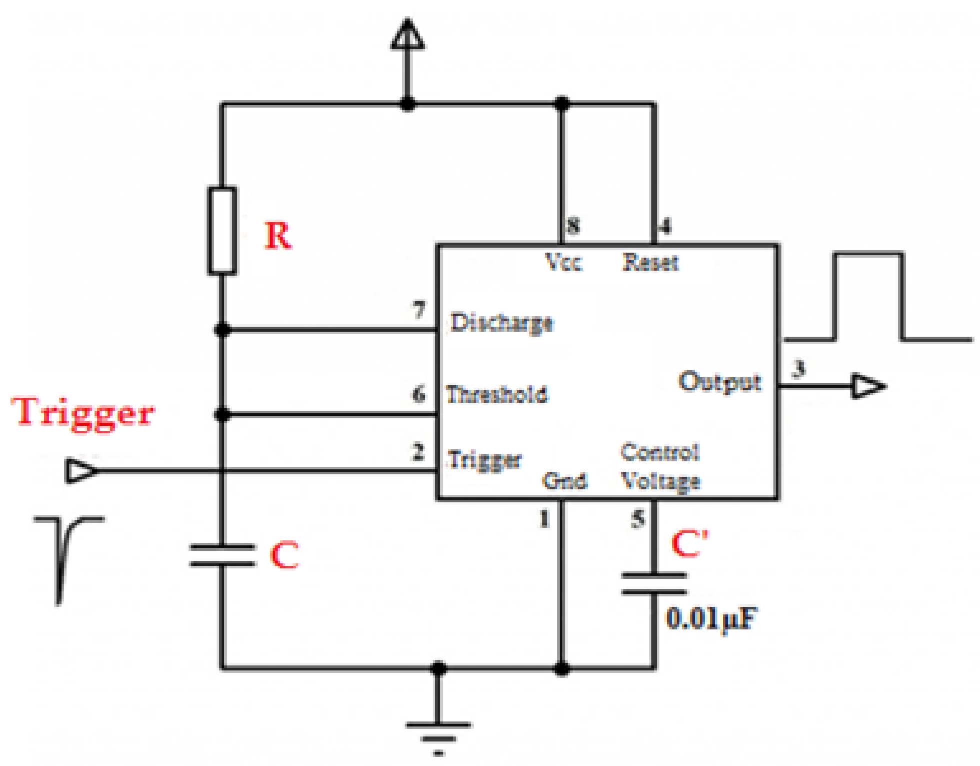


Figure 4.1: TIMER

Answer

QUICK TIPS

To answer this question first identify the function of each IC pin

- Pin 2 (Trigger Pin):
- Pin 3 (Output Pin):
- Pin 6 (Threshold Pin):

Calculate using the formula

T = 1.1 xRxC

Monostable mode

Question 3

Based on Figure 2, calculate the time high (TH) and time low (TL), the frequency of the output, and the percentage of the duty cycle.

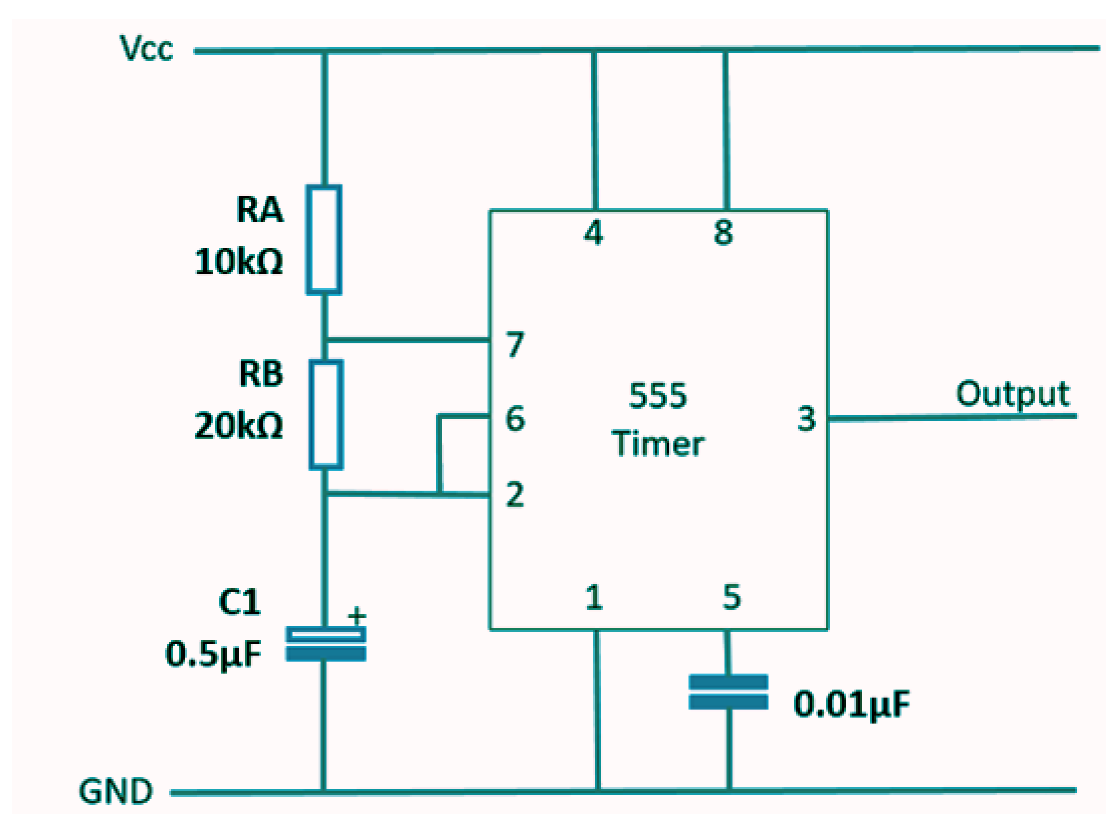


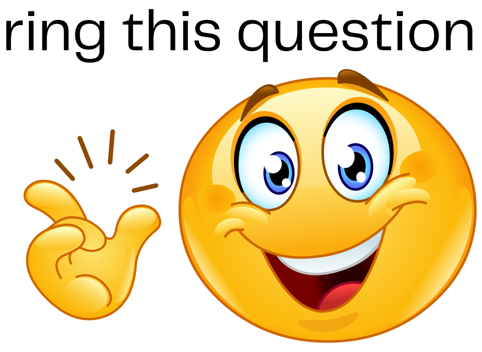
Figure 4.2: TIMER

Answer

QUICK TIPS

The question above has 2 capacitors that can confuse students to answer.

The keypoint to answering this question is to look at the capacitor on **pin 2.**



Question 3

Based on Figure 4.3(a) and 4.3(b) , Calculate RA, RB oscillation frequency (f) and % duty cycle.

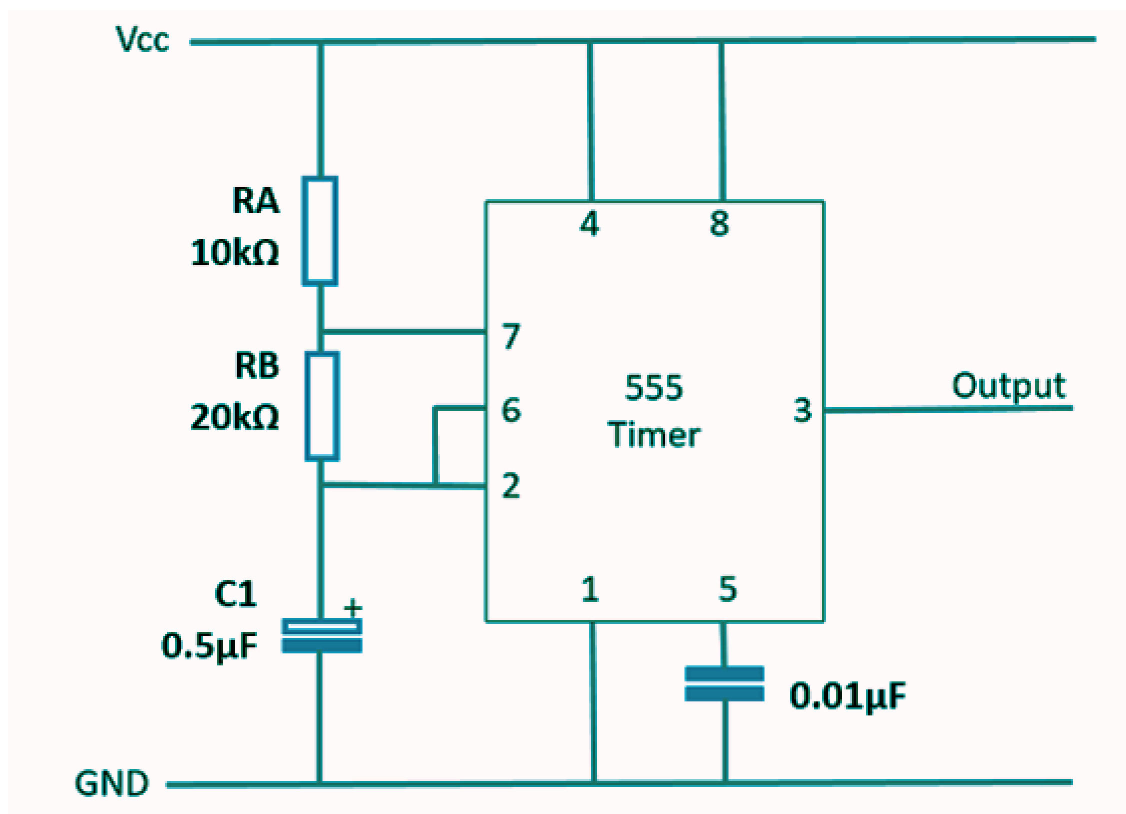


FIGURE 4.3(a)

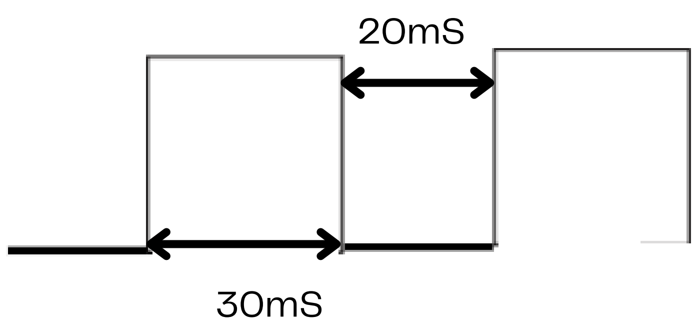


FIGURE 4.3(b)

Answer

QUICK TIPS

To answer this question students need to know how determine the TH value and TL value refer to the waveform.

The waveform is considered to be in a high state is a TH, and in a low state is a TL.

while the capacitor used refers to the capacitor that touches pin 2

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TOPIC 5

FILTER

FILTERING OUT NOISE

What is a Filter ?

A filter is a device or circuit that modifies the amplitude, phase, or frequency content of a signal. Its primary function is to pass desired frequencies while attenuating or rejecting unwanted frequencies. Filters are widely used to enhance signal quality, remove noise, and extract specific information from complex signals.

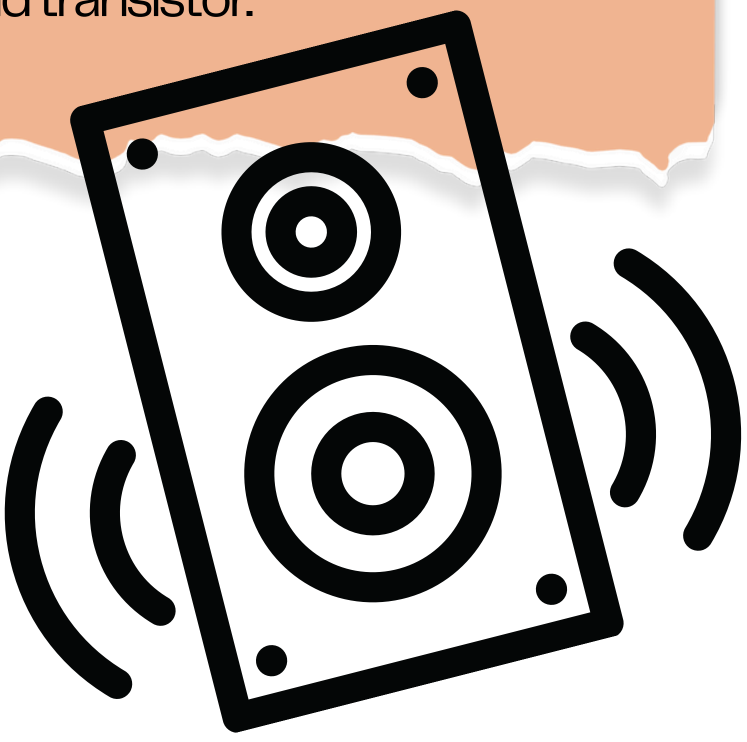
Operating Principles:

Passiive filters

A **passive filter** basically just means that a circuits does not have an amplifier inside of it.
A passive filter can build with basic component like resistors, capacitors and inductors.

Active filters

A **active filter** distinguished by the use of an active component suach an voltage amplifier , buffer , op amplifier and transistor.



FILTERING OUT NOISE

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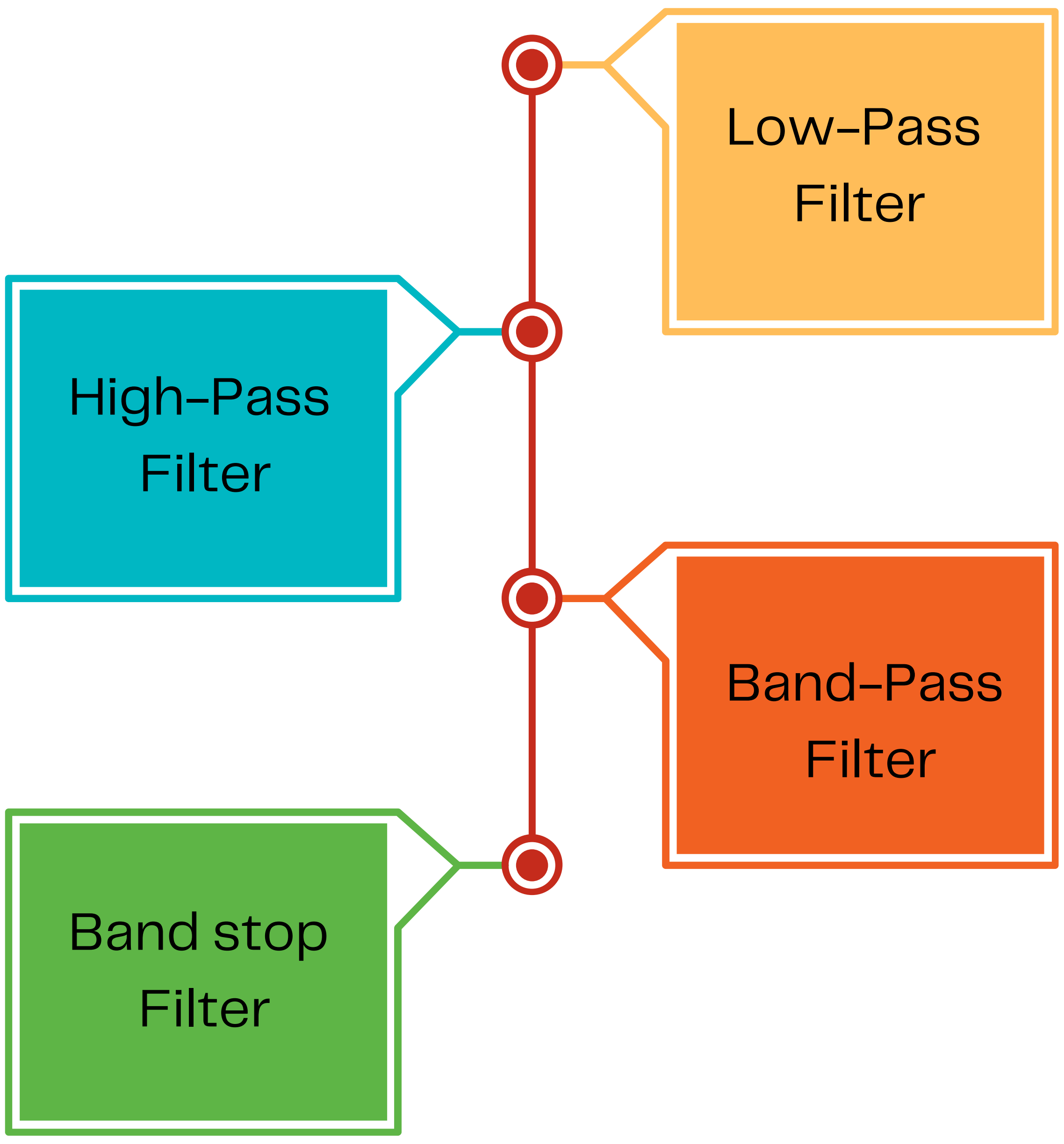
Operating Principles:

Passiive filters

Active filters

Understanding Filter Characteristics:

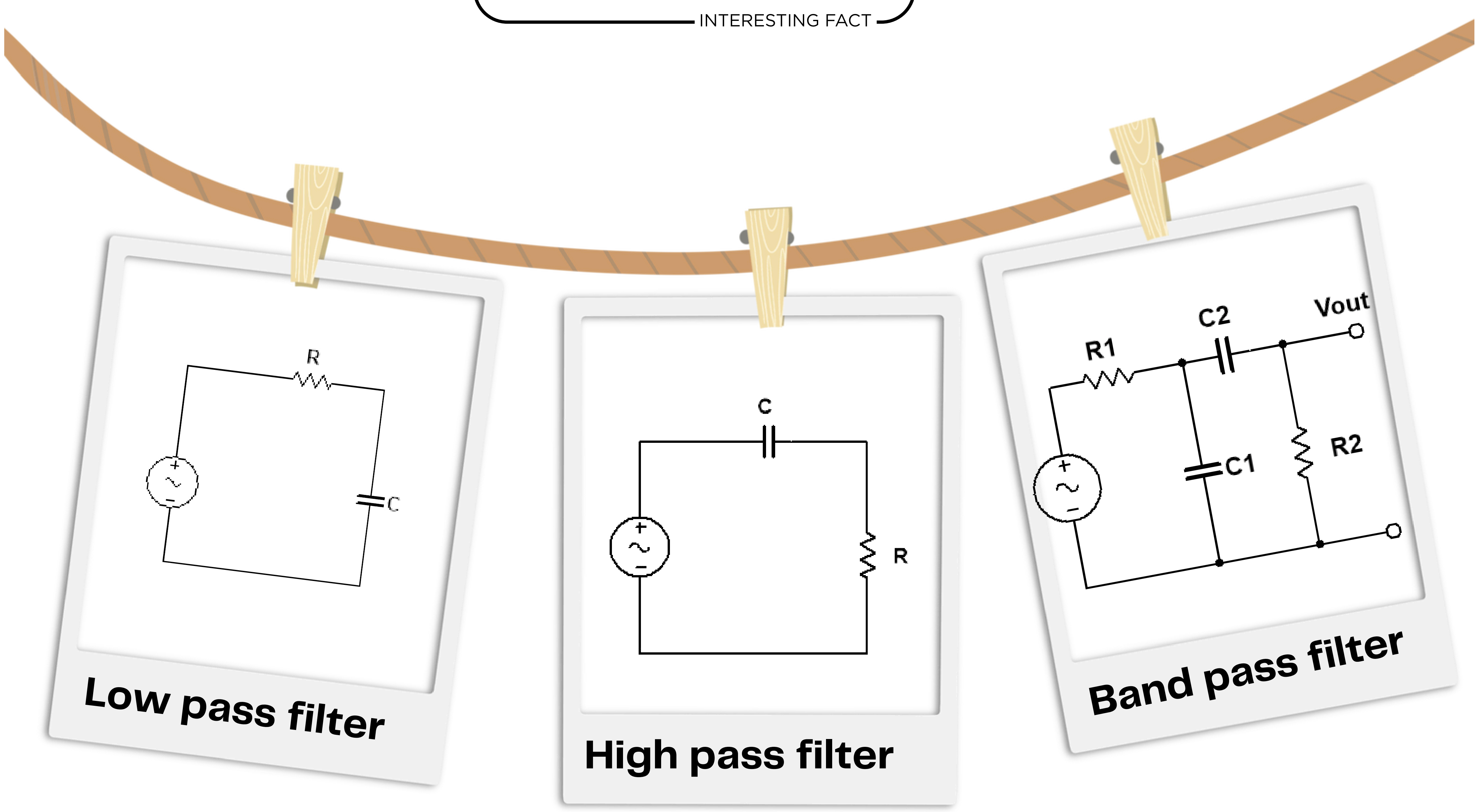
Filters can be classified based on their frequency response and operating principles:



DID YOU KNOW?

How to differentiate between Low-pass filter, High-pass filter and Band-pass filter?

INTERESTING FACT

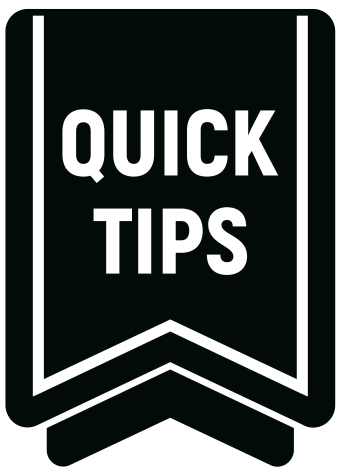


To differentiate between low-pass, high-pass, and band-pass filters, it's important to understand their basic **characteristics, frequency responses, and applications.**

Question 1

Explain the difference between low-pass, high-pass, band-pass, and band-stop filters.

Answer



Key Terms to Remember:

Cutoff Frequency: The frequency where the filter starts to attenuate signals.

Passband: The frequency range that is allowed to pass through.

Stopband: The frequency range that is blocked.

Question 2

Explain THREE (3) differences between an active filter and a passive filter.

Answer

QUICK TIPS

To answer the question regarding the verb differences,the best way is to give the answer in the form of a table

It should be assessed using the **same keyword** for making the comparison.

The **keyword** for this question is that you can see in terms of **components, power supply usage and value of gain.**

Question 3

A Low Pass Filter circuit consisting of a resistor of 4.7 kΩ in series with a capacitor of 47 nF is connected across a 20V sinusoidal supply. Calculate the output voltage (Vout) at a frequency of 200Hz and again at a frequency of 200kHz.

Answer

Step 1: Calculate the Reactance of the Capacitor (XC).

$$X_C = \frac{1}{2\pi f C}$$

Step 2: Determine the Impedance of the RC Circuit.

$$Z = \sqrt{R^2 + X_C^2}$$

Step 3: Calculate the Output Voltage (Vout).

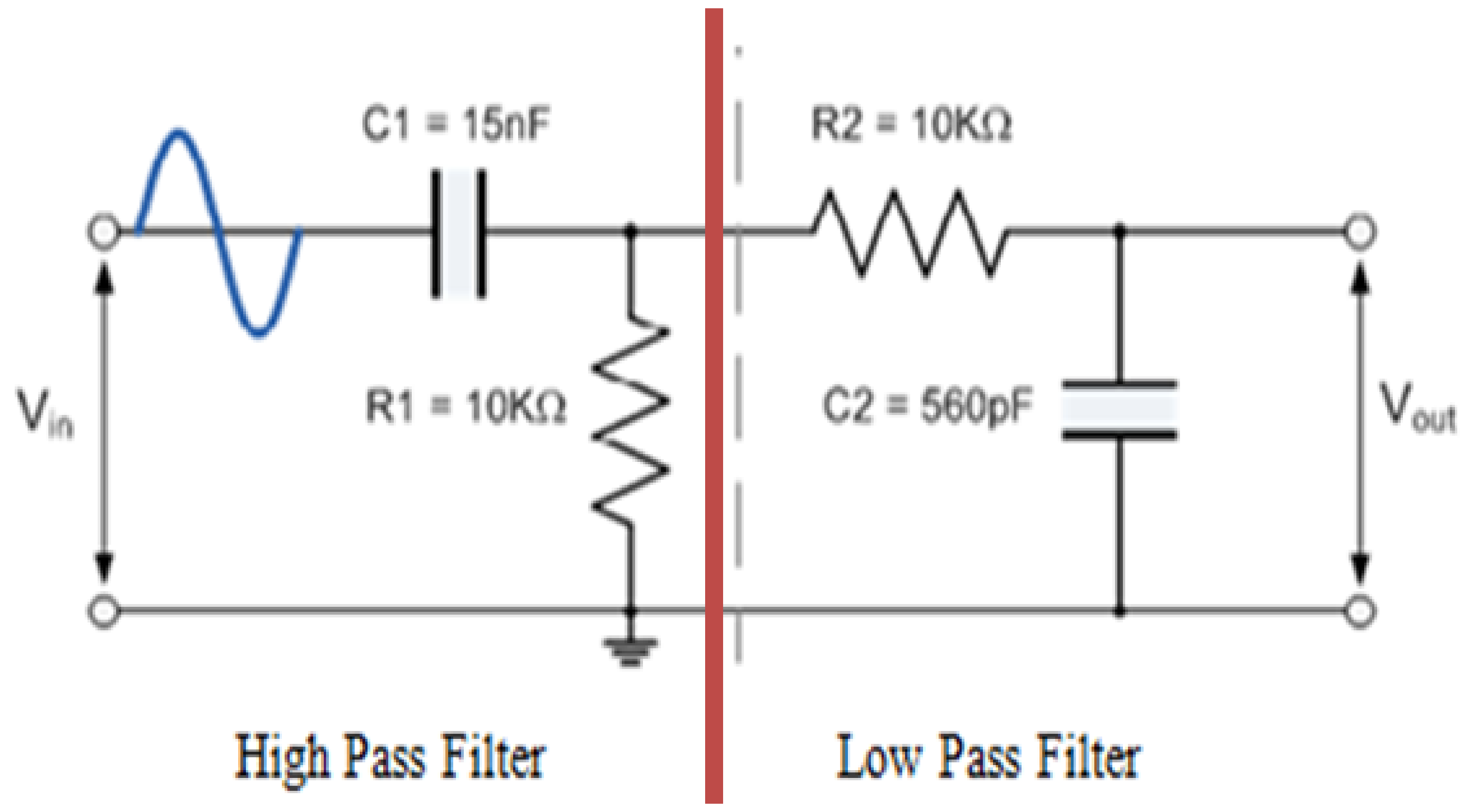
$$Vout = Vin \times \frac{X_C}{Z}$$

Question 4

Sketch the circuit diagram of Passive Band Pass Filter consist of C1= 15nF, C2=500pF and R1=R2=10kΩ. Then calculate the higher cut off frequency, lower cut off frequency and bandwidth for the Passive Band Pass Filter.

Answer

Step 1: Sketch the circuit diagram.



Step 2: Calculate the Lower Cutoff Frequency (fL).

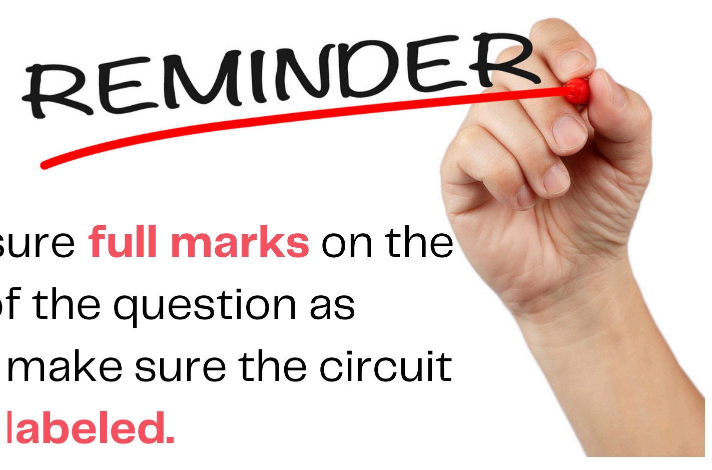
$$f_L = \frac{1}{2\pi R_1 C_1}$$

Step 2: Calculate the Higher Cutoff Frequency (fH).

$$f_L = \frac{1}{2\pi R_2 C_2}$$

Step 3: Calculate the Bandwidth (BW).

$$BW = f_H - f_L$$



To ensure **full marks** on the form of the question as above make sure the circuit is well **labeled.**

Question 5

Based on Figure 5.1, sketch the ideal frequency response second-order high-pass active filter, and calculate the cut-off frequency and voltage gain.

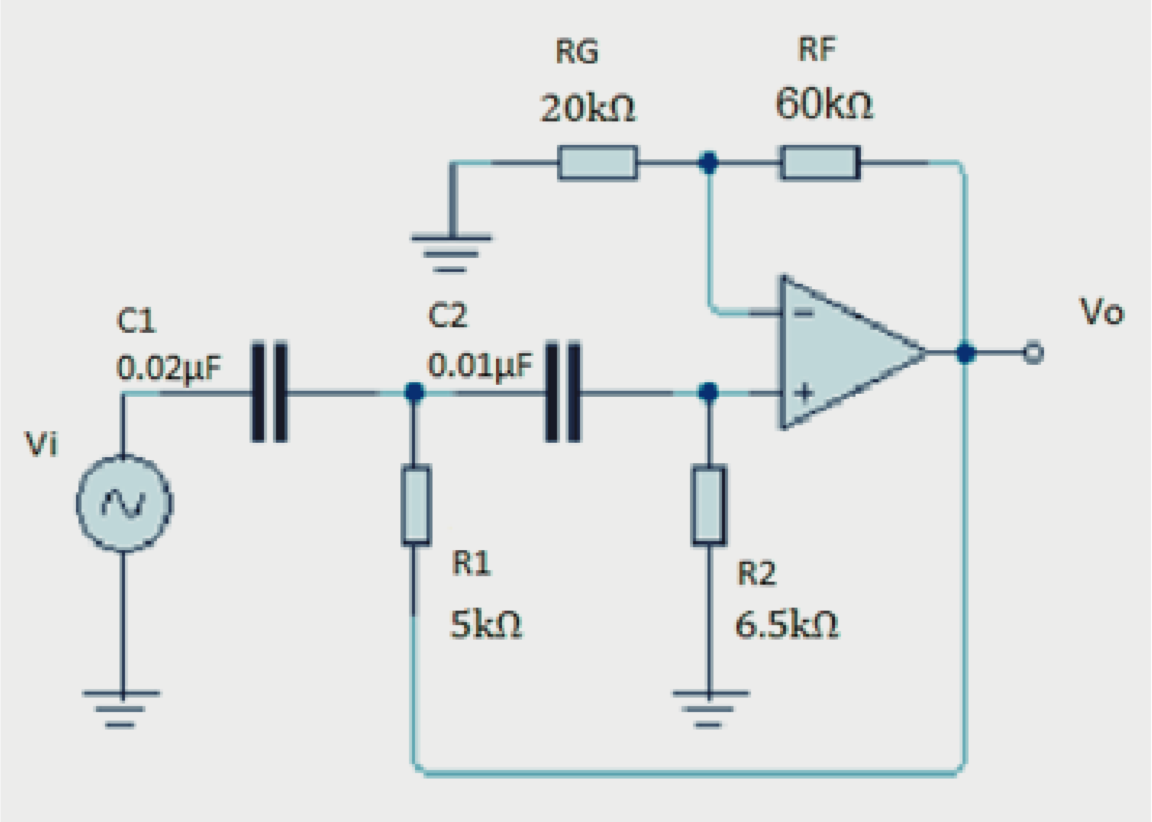
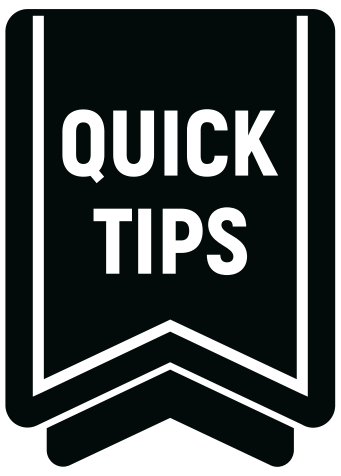


Figure 5.1: High pass active filter

Answer



When asked to sketch the ideal frequency response, be careful not to confuse it with a second-order low-pass active filter.

To determine the high or low pass filter please pay attention to the **position of the resistors and capacitors** on the circuit.

To answer the question of voltage gain, also consider whether the **source is connected to the negative or positive side.**

After determining the incoming source you can determine voltage gain using the appropriate formula.

Question 5

By referring to the figure 5.2, identify the type of filter circuit and expect the output graph of the frequency response curve.

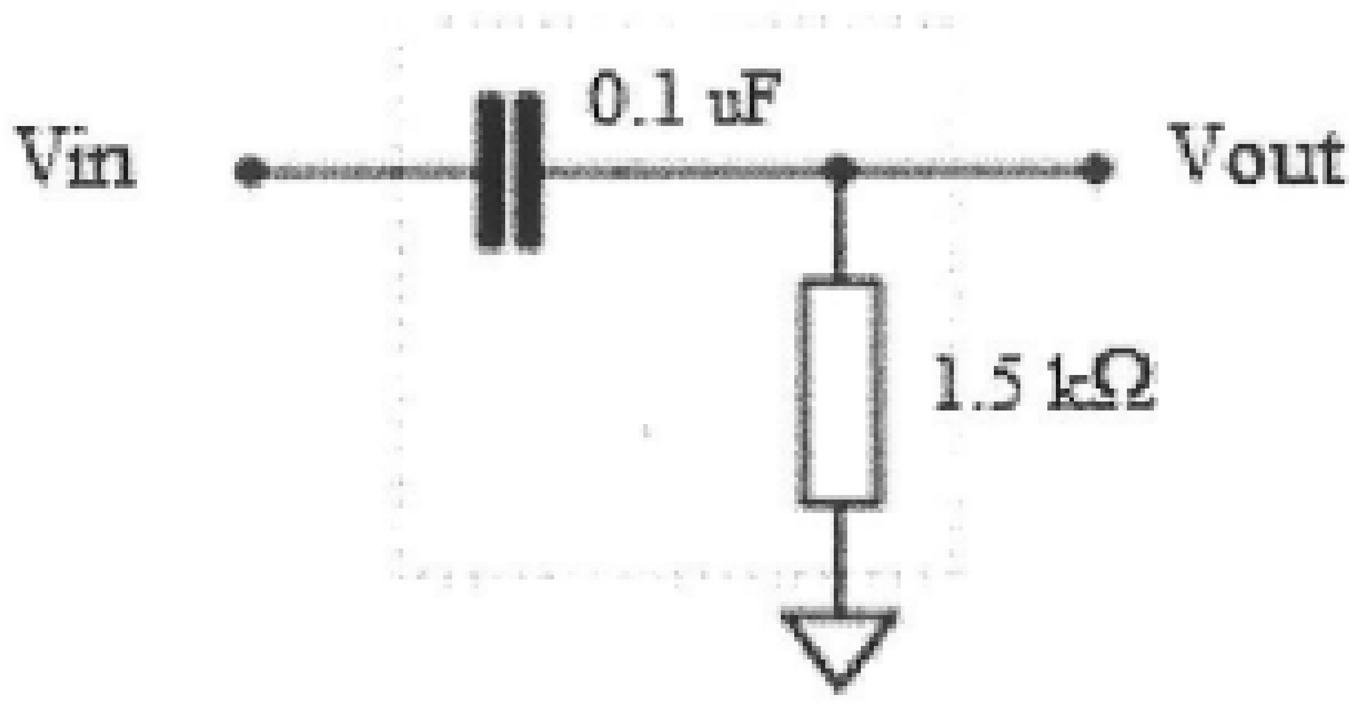


Figure 5.2:Filter

Answer

QUICK TIPS

To answer this question, students must first understand the characteristics of high-pass and low-pass circuits.

The position of the resistor (R) and capacitor (C) is key to distinguishing between low pass and high pass circuits.

After being able to determine the type of circuit, students can draw the frequency response curve.

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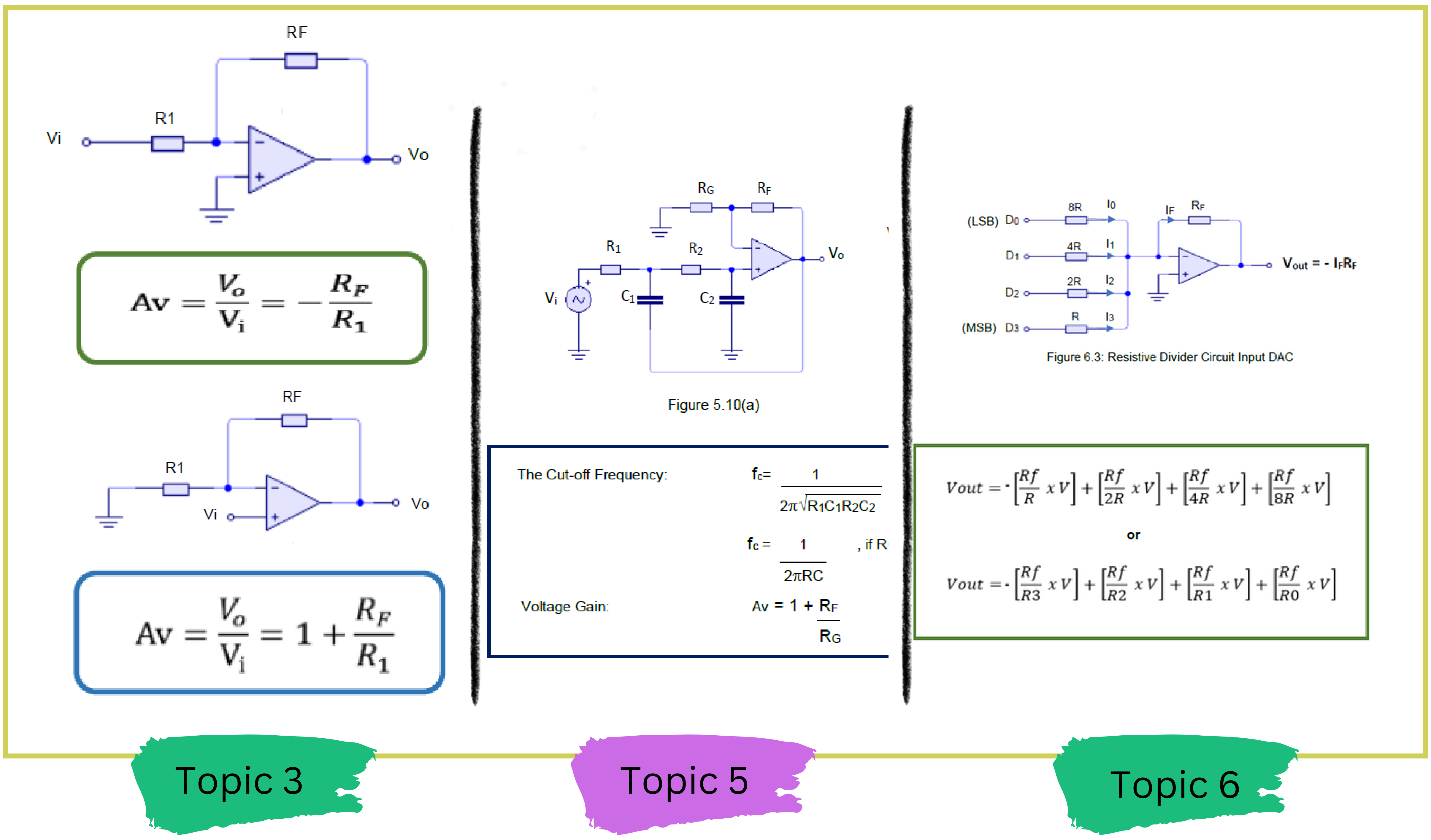
Notes on Electronic Circuits

APPENDIX

REFLECTION

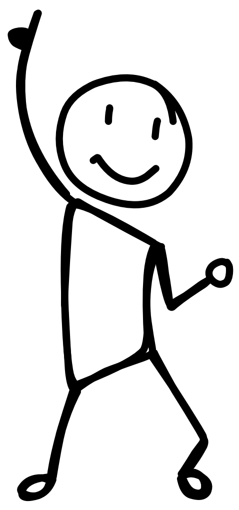
INTERCONNECTION AMONG TOPICS



SUMMARY

Linear DC Power Supply

Concept Overview



Imagine your phone needs a steady, smooth river of power to operate, not a wild, unpredictable wave. A Linear DC Power Supply converts the chaotic ocean waves of AC power from your wall socket into the calm river of DC power that electronic devices need.

Transformer

Think of it as a drawbridge that lowers high voltage to a safer, more usable level.

Rectifier

This is like a valve that only lets water flow in one direction, turning AC into pulsating DC.

Filter

It's a sieve that smooths out the pulsations, making the DC flow steady.

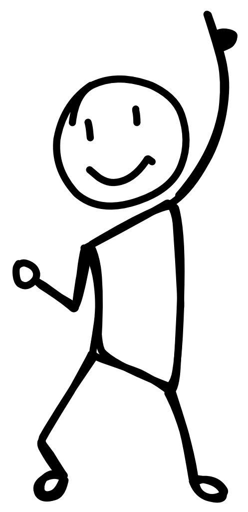
Voltage Regulator

A vigilant guard ensuring the power remains constant, regardless of changes in input or load.

SUMMARY

Oscillator

Concept Overview



Oscillators serve a similar function to a tempo guide in music, providing a consistent rhythm that electronic devices can sync with. They produce a repetitive signal, typically a sine wave or square wave, which other parts of a system rely on for synchronization.

Purpose

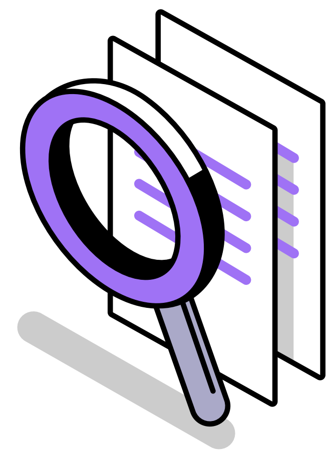
Provides a stable clock signal for synchronizing various parts of an electronic system

Types

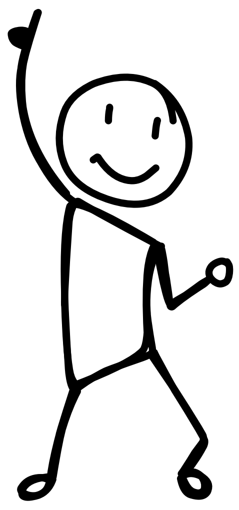
Relaxation Oscillators (like a child's swing, periodically pushed) and Harmonic Oscillators (like a tuning fork, vibrating at a specific frequency)

SUMMARY

Operational Amplifier (Op-Amp)



Concept Overview



An Op-Amp is the multitool of electronic circuits, amplifying signals and performing mathematical operations like addition and subtraction. Imagine it as the magnifying glass Sherlock Holmes uses to scrutinize tiny clues in an investigation.

Function

Amplifies the difference between two input voltages.

Applications

Used in audio equipment, signal processing, and control systems.

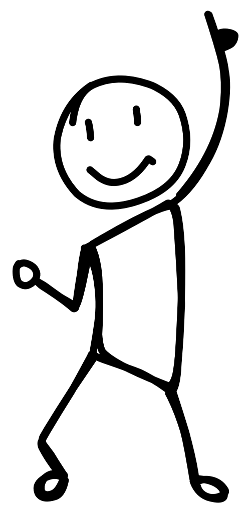
Configurations

Inverting, non-inverting, summing, and differential amplifiers, each with unique properties and uses.

SUMMARY

Timer

Concept Overview



Timers are like the countdown clock in a cooking timer, controlling the duration of processes in electronic circuits. They are critical for tasks that require precise timing.

Functionality

Timers generate precise time delays or intervals. They can be used to turn devices on or off after a set period, produce a series of pulses, or generate a continuous waveform.

Monostable Mode

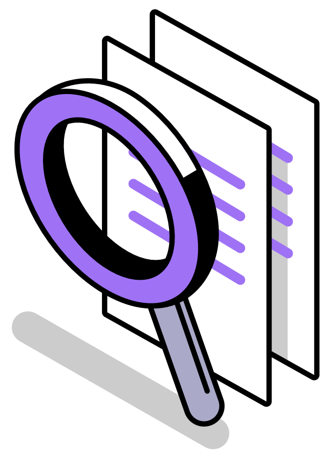
Imagine a stopwatch that you press to start; it runs for a set amount of time and then stops. This mode is used for single, timed events like generating a precise delay.

Astable Mode

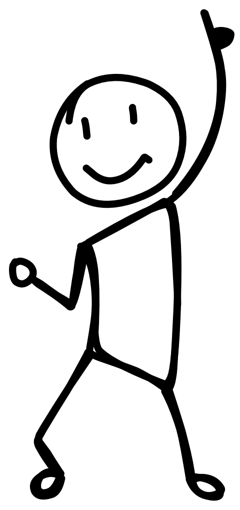
Think of a blinking light on a Christmas tree, continuously turning on and off. This mode is used for creating continuous pulses, perfect for things like clock signals and blinking LEDs.

SUMMARY

Filter



Concept Overview



Filters are like coffee strainers, allowing only the pure essence to pass through while blocking the unwanted grounds. They refine signals by removing noise or separating different frequency components.

- **Low-Pass Filter: Like a sieve that lets through small grains of sand (low frequencies) while blocking larger pebbles (high frequencies). Used to remove high-frequency noise from audio signals.**
- **High-Pass Filter: Imagine a filter that only lets through big pebbles (high frequencies) and blocks the small grains of sand (low frequencies). Useful for removing low-frequency hum from signals.**
- **Band-Pass Filter: Think of it as a gate that only lets through medium-sized pebbles (a specific range of frequencies) while blocking both smaller grains and larger pebbles. Used in radio tuners to select a specific station.**
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REFFERENCES

1. Mitchel E. Schultz, (2011) Grob's Basic Electronic (11th edition) McGraw.Hill
2. Boylestad, R., & Nashelsky, L. (1996). Electronic Devices and Circuit Theory (7th ed.). Prentice Hall.
3. Albert Malvino & David Bates (2016). Electronic Principles (8th edition). McGraw-Hill Education

STANDARD SI PREFIX

Standard from	Prefex	Symbol
10^{12}	Tera	T
10^{9}	Giga	G
10^{6}	Mega	M
10^{3}	Kilo	K
10^{2}	Hecto	h
10^{1}	Deca	da
10^{-1}	Deci	d
10^{-2}	Centi	c
10^{-3}	Milli	m
10^{-6}	Micro	µ
10^{-9}	Nano	n
10^{-12}	Pico	p

Any comments and suggestions can be made at the following link.

Electronic Circuit Tips & Trics Question

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