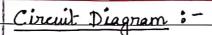
Experient No 1
tone 20, ne i jied
Title or Realization of V-I and I-V conventin using the
epostino amplifica.
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Aim : The aim of this experiment is to find out the chapace
tenishes of op- amp while as voltage to consider
enventer and so an envent (I) to voltage (v)
and of souler SICABHISHEK SHARMA! A Tolorens
Department of Computer Science and Engg.
TURD NEAR
SECTIONA- I Common & Silveroged
ROLL NO: 01
(band ENROLLMENT NO : 1201900 900 1127.
endiese (vi)
MANALOGNELECTRONICS CIRCUIT LAB (Day 4).
(ii) importing coures.
ASSIGNMENT-4
(Experiment No.: 04)
Thorny: Voltage and current one the hosis quartes. They can the
m probagge Daters -27.08.2021 some se
environment. Voltage to current conventix and current to
University of Enggineering & Management Kolkala
convergion.
Voltage to connect converting - A V-I enverter is on
electronic strenk that takes
toplare as the and and produces the nottone or ordines.
An op- amp based rollings to cooren't convention preduces
an order correct when a roltage is applied in the
non inventing terininal.
The goods equation at the inventing input terminal's moder
Ri - Io = V Io = Ri.

	Experiment No 1
	Experiment No. 4 Date: 27.08.2021
,	Taxe
	Tell :- P 1: 1- P 1: T 1 T 1
-	Title . Realization of V-I and I-V converter using the
.——	Title: Realization of V-I and I-V converter using the operational amplifier.
	Aim: The aim of this experiment is to find out the charac-
	teristies of op-amp while as voltage to current
	convertex and as an current (I) to voltage (V)
	converter. Also observe the calculated values to the
-	observed values from the circuit.
,	THEO VEAK
	Apparalus Required : (i) AC power source
	(ii) Gnound.
	7.211 03 P 00 P 1 x (iii) op = amp (3 channel)
	(iv) resistors.
	(v) probes (voltmeter and ammeter).
-	(vi) connecting wures.
	(a. A. M. managas)
	Theory: Voltage and ewvient are the basic quantics. They can
	be converted into one another depending on the
	Theory: Voltage and current are the basic quantics. They can be converted into one another depending on the environment. Voltage to current convertor and current to
	voltage converter are the two circuits that help in such
	conversion.
-	
	Voltage to current converter: - A V-I converter is an
	electronic circuit that takes
	eurvient as the input and produces the voltage as oulput.
	An op-amp based voltage to current converter produces an oulput current when a voltage is applied in the non inverting terminal.
	an order current when a voltage is applied in the
	non inventing terminal.
	TWIP ALVANDA
	T \ \ \ \ . \ \ . \ \ \ \ \ \ \
-	The nodal equation at the inverting input terminal's node- $\frac{V_i}{R_L} - I_0 = 0 \Rightarrow I_0 = \frac{V_i}{R_L}.$
	$\frac{V_1}{V_1} = I_0 = 0 \Rightarrow I_0 = \frac{V_1}{V_1}$
	RL RL.

We	can rewrite, the above equation as To RE
ar The	c above equation rupresents the natio of the output current
	and the input voltage Nis it is equal to the recipro-
ca	I of the resistance Ry The vatio of the output current
	and the input voltage (Vo) is called Transconductance
	(ii) Drag and Amor all the required items and place them
	Current to Voltage converter : The current to voltage
	partierna att answertenbaga converter produces and
	put voltage when current is applied at the inverting
in	a of the op-amp.
. 1.14	a of the op-amp.
wiTh	e modal equation at the involting terminal would be,
	for the Not I wash for both the include.
	- I; + 0 - Vo = 0.
sirt ro	(i) From this, previde the obsert third and enablesimal for exportance := II = Vo = (i) = Vo = (ii) for the observable in the continue of the
	=> - Vo = Ii
	<u>'</u>
the:	Cabulation : For V-I confAit -HE 1981/5 equation at
	inventing order with he
Th	rus the output voltage, Vo of eworent to voltage converte
is	the inverted (negative) product of the feedback
res	rus the oulput voltage. Vo of ewvient to voltage converted the inverted (negative) product of the feedback sistance. Re and input current. I'i. Now, we can
w	rile the above expression was in that at anylor
	VI = Tonjust Voltages OV RI = Load Resist Ruce II
	Residences of
	11
despeth	is ratio of the output voltage and input current is
ca	Med Transresistance. So, the gain of the coverent to
vol	tage converler its transresistance and it is equal
to	Med Transresistance. So, the gain of the convent to tage converler its transresistance and it is equal the feedback resistance (RF).
Wage	=> - II - Pe = 0. cohene Vio = Bulput vo
10 11	
usiston	=>-I= Kt Re- fredback x
	=> Vo = - IR4
	**

	· ɔ ,
	Procedure :- The procedure of this experiment is as follows -
_ 7.6 _ 00	(i) Open any of your internet browser and go to Multisim lives simulator, click on the new circuit and create a new
1	arcircuit parea for these two levrents much is not to las
	(ii) Drag and drop all the required items and place them
	according to the circuit diagram once the components
	wires and all to bilder is to reme many matter willow
	ame-an att is and
	(ue) After making the connection of this circuit, simulate the
	(iii) After making the connection of this circuit, simulate the circuit and observe the values. Go to the grapher section for the V-I and I-V graph for both the circuits.
	(iv) From this, provide the observation and conclusion for this experiment.
	Calculation: For V-I converter, the modal equation at the inverting output will be.
valev	Thus the output wife as in the mount to voltage conv
	should the Ion => Io Ety RE belowing with ai
	where, Io = Output current is a role and silver
	Vi = Imput Voltage RL = Load Resistance:
	And for I - V converter, the nodal equation at the non-inverting
	- Li + Rf mart sizer stadback att at
	$= \sum_{i=1}^{\infty} -\overline{I}_{i} - \underbrace{Vo}_{i} = 0.1$
	Re where Vo = Output voltage
	=> - Ii - $\frac{V_0}{R_f}$ = 0. where, V_0 = Oulput voltage => - Ii = $\frac{V_0}{R_f}$
	=> Vo = - IiRq
	7

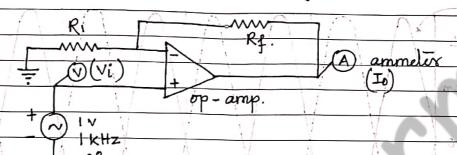


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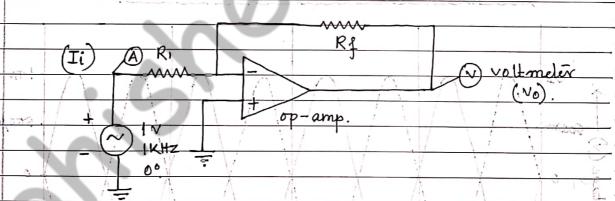
Erraph :

1) V-I (voltage to evount) convertex using Op-Amp.:

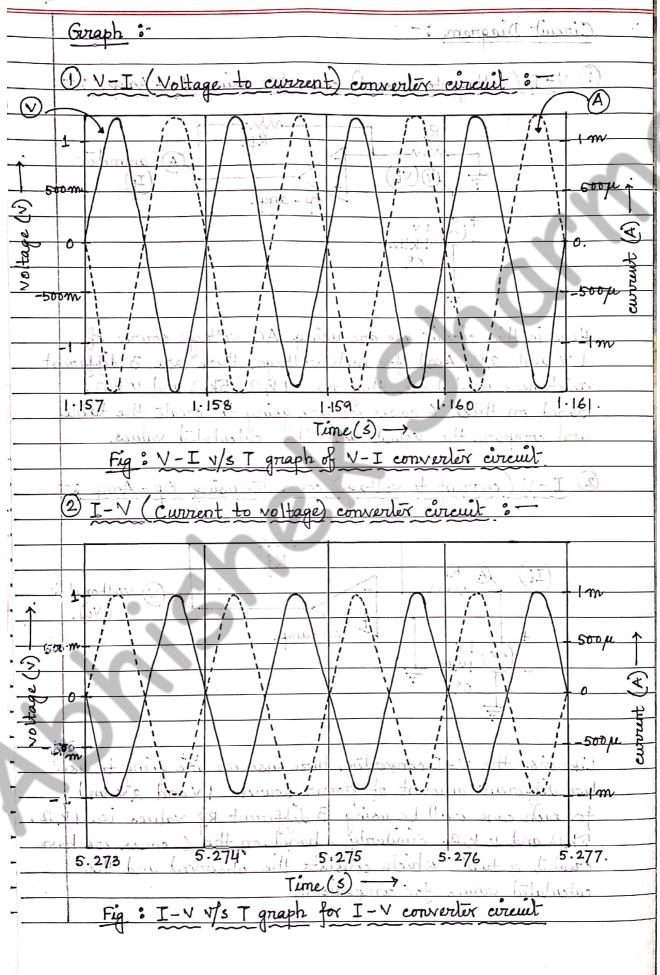


Here in this circuit we are using AC voltage source of IV and 2V. And for each voltage, there are 3 different resistances used here, they are, IKD, 5KD and 10 KD. Based on these 6 cases we are going to create the table and compare the actual and the calculated values.

2) I-V (current to voltage) converter using Op-Amp:



Likewise the V-I converter, here also we are going to use two different amount of power sources I V and 2 v and for each case we'll be using 3 different Rf values ie. IKD. 5 kD and 10 kD. Similarly, based on the 6 cases we have created a table which consists the observed and the calculated values for comparison.



al had staying	J. 49. 610	0.401	
Observation Tak	ole a	10 KJ 105	
1 949 - 95 m.	(-0-401 X		_Vi_
1 V-I convert	ex using 0	p-Amp :- Io =	RL
Input Voltage	Resistance	Oulput A (calculate	
Input Voltage	(.(RL) X	$I_0(c)$.	Io (Obs).
	1. 99764	Inc = 998.49 mv.	
	1.K-22		998.48 MA
X As	Vi = 998.49		AC conser.
AC power	5 k = ?.)	Ioc = 998.49 mv.	source voltu
source voltage	5 k.2.		The second secon
1 V.	Vi= 998.49m	= 199.698 MA.	199.70 MA.
XA	1,07.191-70	Tac = 998.49 mV	
1. 9970 M.	10 K-10	10 K-12	99.848 MA
	Vi= 998.49m	= 99.85 MA	
		Ioc = 1.9970 V.	
	1 K-12	1 K2	1.9970 mA
	Vi=1.9970 V	= 1.9970 mA	
		Ioc = 1.9970 V.	
2 V.	5K-2	5K-12	399.39 MA
	Vi=1.9970V	= 399.4 MA.	Condusion
		Ioc = 1.99701	
more bilarlin exil	10 KV	10 K2	199.70 MA
Two structs out	Vi = 1.9970N	= 199.70 MA.	laturis at
have constituted	arma.	בחינית משונה בסי	14 - T 600
(2) T-V conver	ter using of	-Amp i- No =	- I RA
		MA without the	w up ban
Power source	Resistance	Output V (calculated)	Output V (obs.)
2. voltage	(RL)(12)	(Voc) W	(Voobs) v.
(Voc = - (-998.48/1.)	+ air itta
	1 k-s2	x 1 k-2)	(+)998.48 mv.
AC power		= (+)998.48 mV	
Source voltage			
(IV)	5 k-2.	Voc = 199.70 MA.	998.48 mv.
		x 5 k-2)	
G No.		= 998.5 mV	7

W 2 1	101.0	1 40 010	12 12				
-	10 K-T2	Voc = (- 99.848, p.A.	998.48 mv.				
iv	7	X 10 K-D)					
- 13	- 2 - 2 am	1 = 1998: 48 mN	1 I-V (!)				
7							
1) Oulput A (obs.).							
Io (662).	I. (2) .I	X IKO)	(11)9970 V				
	प्रात्ति भव	=1 1.9970 V					
998:48 MA.							
AC power	22 K-U	Voc =- (-399.39 MA X					
source volta	96.00 000	5k-Ω)	1.9970 V				
· Au 34 . 82 V	25/2	= 1.99695 V	sounce in				
199.70 MA.	A 4 8 1 3 . 1 1 1 .	VILLAGIT. DEN EIV					
	Var Plok-20 =	VOC = (-199.70 MA X					
99.848 MA.	TC N 01	10 KLD)	1.9970 V.				
	= 99.85 µ4	= 1.9970.V	6				
	. 1.9970 /.	, T					
1.9970 mA.	1 K-12	201	1				
	-1.9970 mA	Vi=1.9970 V					
	1.4970 1.	7					
399.39 uA.		577.9	2.4.				
· 14 m LC . LLC		Vi=1-4470V					
Conclusion	= 349.4/14.00 =	-					
	27701	• 100001 -					
		on of the parameters					
		simulating the two					
		op-amp, we have					
		successfully built on					
and simulated perfectly. All the observed and calculated							
results sh	ows us the eff	iciency of implements	tion. Hence,				
		se have deployed the					
	lexance						
(t) 998. 48 mm	x ! k-2)	1 1 2					
	98.48mv	P(+) =	AC percen				
-		N	อง วาเกอร				
998.48 mv.	(- 1994 1988 144.	SKIZ. VOC =	(1)				
1	X 5 K-12)						
2	18 · 5 mV	9 = 90					