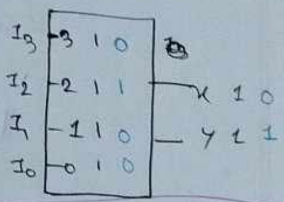
1 1 11 11 1 0

A	B	C	Y = ABC
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	$\boxed{1}$



1 1 1 0

$I_3 > I_2 > I_1 > I_0$

$I_2 > I_1 > I_3 > I_0$

$\bar{A}$ $\bar{B}$ $\bar{C}$

0 0 0 = 1

15/2

priority encoder

I_0	I_1	I_2	I_3	x	y	
X	X	X	1	1	1	– 3 I_3 high priority
X	X	1	0	1	0	– 2
X	1	0	0	0	1	– 1
1	0	0	0	0	0	– 0 I_0 low "

Note:

X = don't care

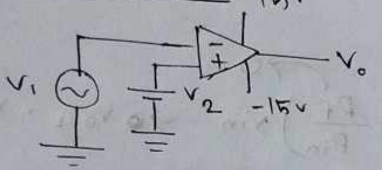
output will always depend on the priority list.

$x = I_3 + I_2\bar{I}_3$

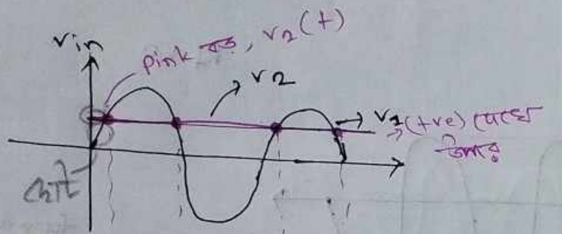
$y = I_3 + I_1\bar{I}_2\bar{I}_3$

Comparator circuit:

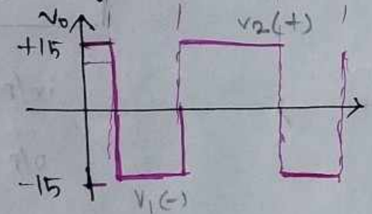
DC → P-N:



① wave shape draw
② intersecting point বের করা
③ compare
④ বড়টা অনুযায়ী square wave

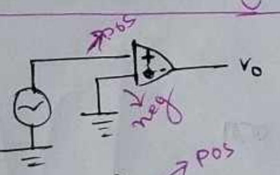


* যে বড় সেই ratio তে output square হবে।

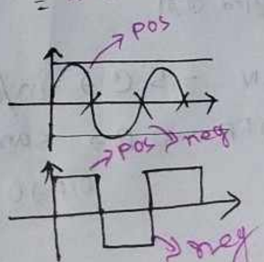


•highest o/p → 15V।

* Zero-crossing Detector:



O/P → Square wave

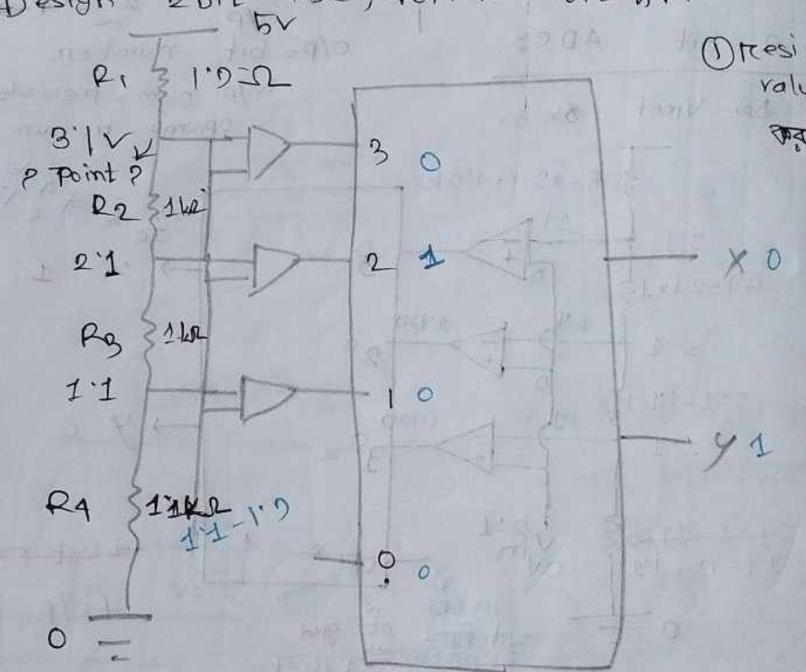


0 তেলা

Vref = 5V হলে

(Voltage)		O/P	
(not fixed) 0	— 1 —	0	0
1.1	— 1.7 =	0	1
2.1	— 2.7 =	1	0
3.1	~ =	1	1

* Design 2bit ADC, ~~volt~~ ref. vol = 5V.



(1) resi গুলোর value বের করা

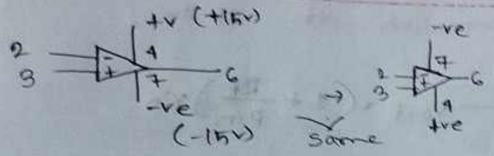
$R_1 = 5 - 3.1 = 1.7 k\Omega$

* 4 to 2 line priority encoder

book - (1) Coughlin (OP-Amp)
(2) Ramakanto A gaykoard

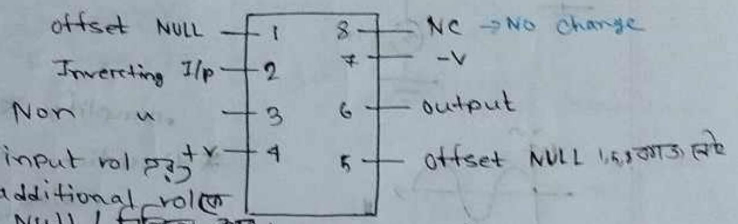
Operatinal Amplifier

6/2/24



এর দ্বারা যোগ, গুণ, ভাগ, diff, Inte করা যায়

biasing - 15v

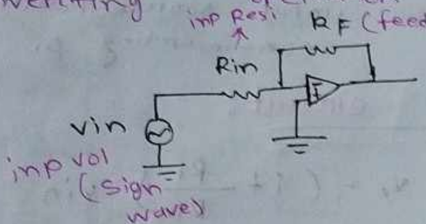


<u>offset NULL</u>: additional volকে NULL / নিষ্ক্রিয় করে।
offset exactly 0 আসে না।

f: pin configuration

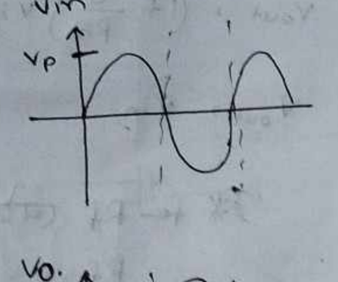
~~OP~~

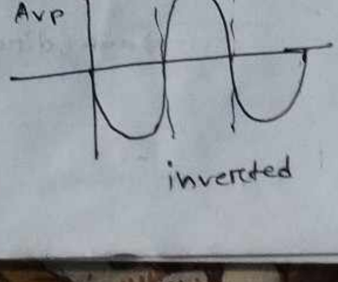
Inverting operation of OP-Amp:



$$\boxed{V_{out} = -\frac{R_F}{R_{in}} v_{in}}$$

$= -A\, v_{in}$





inverted

ans

(*) Design a inverting OP-Amp whose output will be 9v.

(resi এর value বের কর)

$= V_o = -\frac{1k}{1k} \times 3v$ | Rf = 1 kΩ, Ri = 1 kΩ

$= -3v$

next thursday quiz-2
(22.2)

ADC → Analog to digital converter

13/2/24

*design a 2bit ADC / 3bit ADC.
↓
resi গুলর value বের করা (for opam)

N-bit number = o/p

2^n = ~~output~~ input, n = o/p

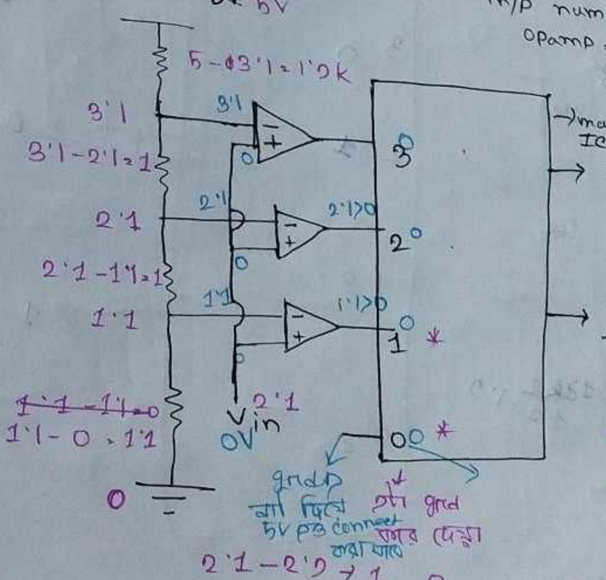
2 bit ~~in/p~~ o/p → 2^2 = ~~4 → o/p~~ i/p

o/p = bit number   o/p = 2

in/p num = resistance num

opamp = r. num - 1

2 bit ADC:



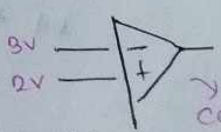
op-amp

~~*last গুলর রাখী o/p দেখাবে.~~

*o/p always highest দেখাবে.

num of OPAmp = Resi. num. - 1

	o/p		দেখাবে o/p
v_{in} = 0,	0 0	0 0	0 0
	0 1	0 0	0 1



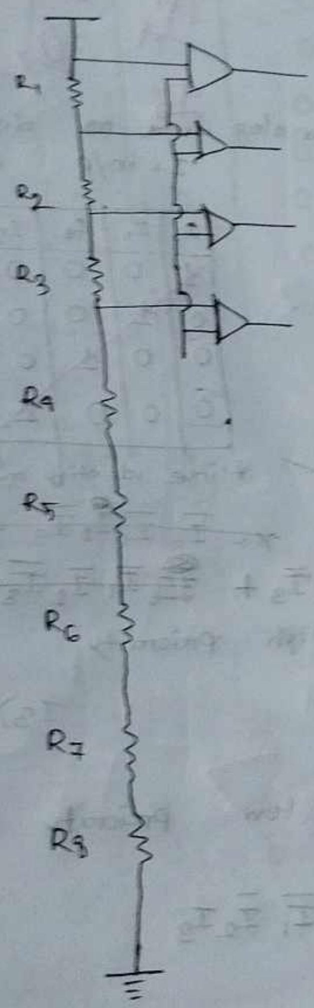
→ comparator op-amp

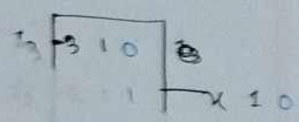
• (−) > (+) → 0

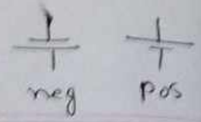
• (+) > (−) → 1

1 1 1 0

3-bit ADC:

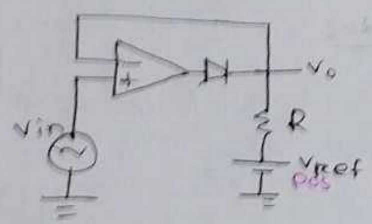




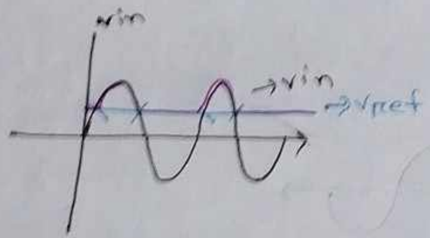


Forward bias Diodes

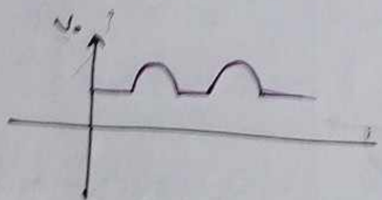
Positive DC voltage:



I/P

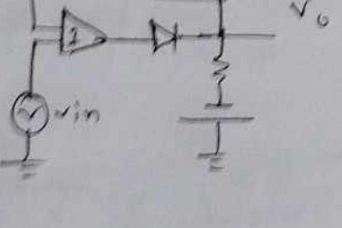


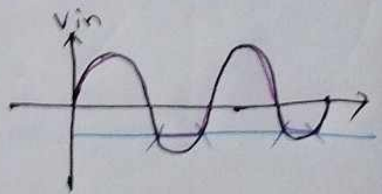
O/P

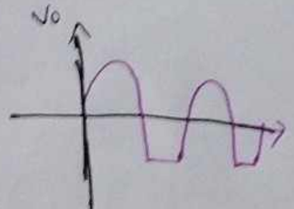


* এটা vol এর থেকে [illegible] বড়, তাই দেখাবে।

Neg DC vol:



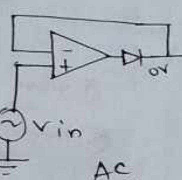




8/2/24

Half wave rectifier:

Forward bias Diode:

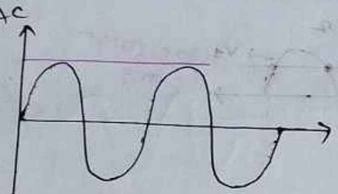


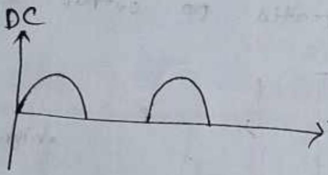
$v_o = \left(1 + \frac{R_f}{R_{in}}\right) v_{in} \Rightarrow v_{out} = v_{in}$ ($R_f \to 0$)

$R_f = 0$

* similarity with vol. fol. cir.

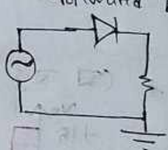
diode ! main diff





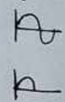
EEE is the best!!

forward bias, তাই pos→o/p



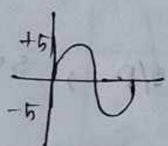
in/p

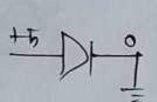
o/p



*diode না থাকলে

i/p , o/p same হবে





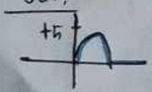
gnd করা

A > K diode – ON – S.C → in/p o/p same

K > A " OFF – O.C → same না

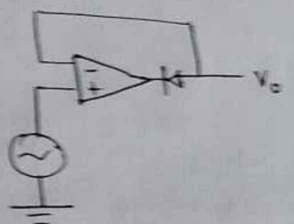
o/p → 0

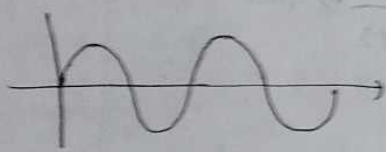
out:



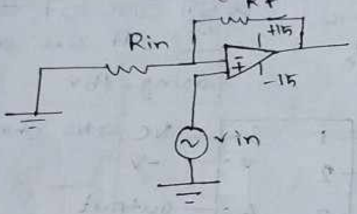
* NMOS : 0 জন্য পাওয়া যায়,
* PMOS : ১ জন্য "

Reverse bias Diode:

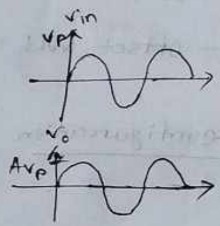




NON inverting operation of OP-Amp:



$V_{out} = \left(1 + \frac{R_f}{R_{in}}\right) v_{in}$



• amplify করে দিবে।

* direction same থাকে।

• value change হবে।

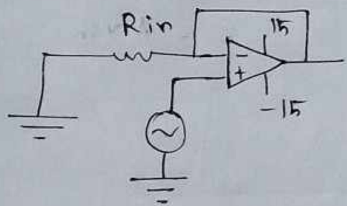
$V_0 = \left(1 + \frac{1}{1}\right) 3$

$= \cancel{(1+2)} \cdot 2 \times 3$

$= 6V$

• input source positive হ। so, non-inverting হ।

Voltage follower circuit:

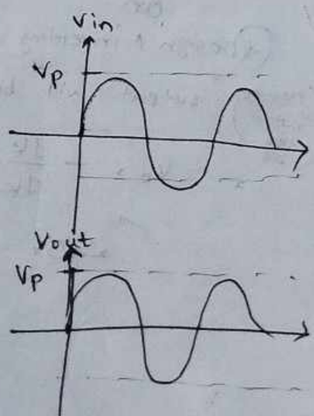


$V_0 = \left(1 + \frac{R_f}{R_{in}}\right) v_{in}$

$V_{out} = \left(1 + \frac{0}{R_{in}}\right) v_{in}$

$V_{out} = v_{in}$

Peak voltage



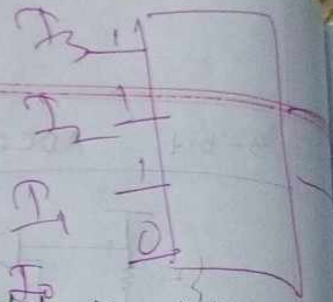
* ~~fe~~ Rf নেই।

$R_f = 0$.

* amp, direction same.

$V_{ref} = 5V$ হলে
(voltage)

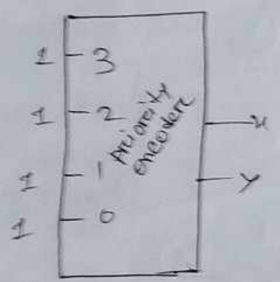
(not fixed)		O/P
0	– 1 –	0
1.1	– 1.9 =	0
2.1	– 2.9	



encoder analog data to digital করে
I = in/p x, y = o/p

I_0	I_1	I_2	I_3	x	y
1	0	0	0	0	0
0	1	0	0	0	1
0	0	1	0	1	0
0	0	0	1	1	1

*like identity matrix



~~$x = \bar{I}_0 \bar{I}_1 \bar{I}_2 \bar{I}_3 + \bar{I}_0 \bar{I}_1 \bar{I}_2 \bar{I}_3$~~

1 হলে $x = \bar{I}_0 \bar{I}_1 I_2 \bar{I}_3 + \cancel{\bar{I}_0 \bar{I}_1 \bar{I}_2 \bar{I}_3}\ \bar{I}_0 \bar{I}_1 \bar{I}_2 I_3$

priority encoder

I_3 High priority
I_2
I_1
I_0 low priority

$I_3 > I_2 > I_1 > I_0$

I_0	I_1	I_2	I_3	x	y
X	X	X	1	1	1
X	X	1	0	1	0
X	X	0	0	0	1
1	0	0	0	0	0

(1) $Y = \bar{I}_0 I_1 \bar{I}_2 \bar{I}_3 + \bar{I}_0 \bar{I}_1 \bar{I}_2 I_3$

x = don't care

output will always depend on the priority list.