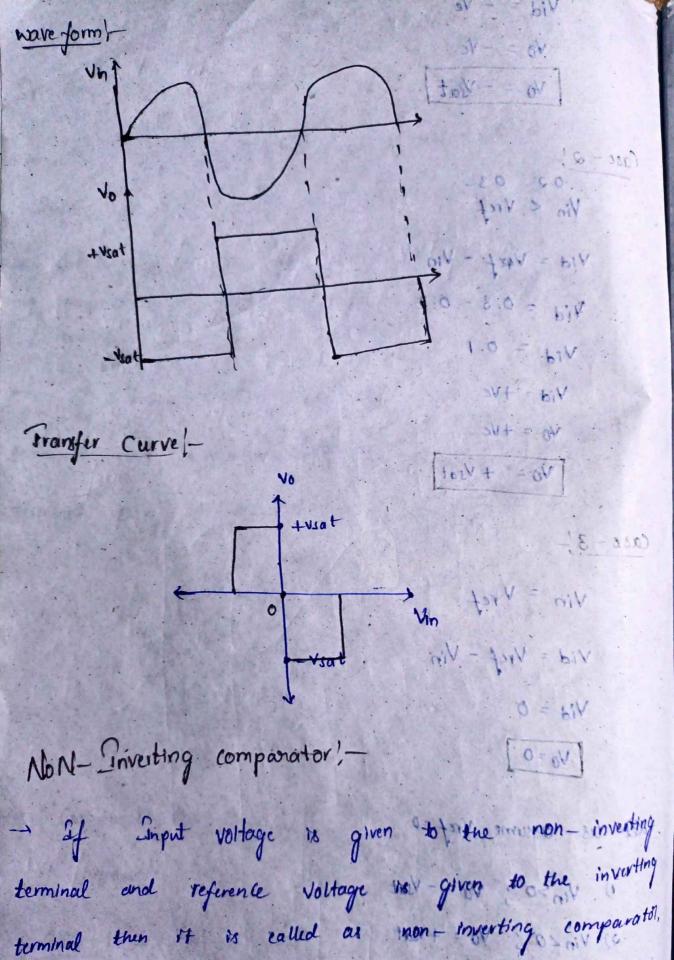
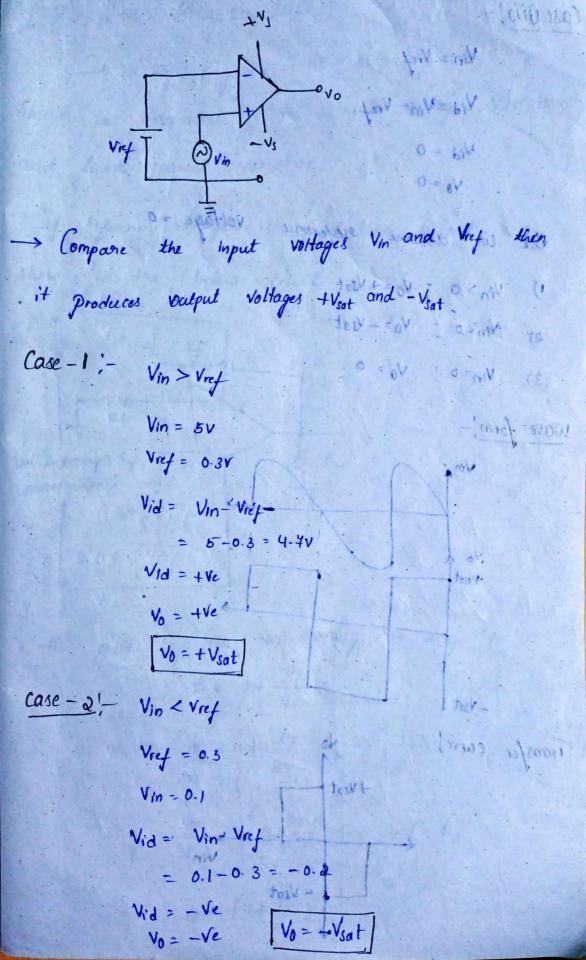
unit - 2 e whom to don plate Op-Amp as a voltage componatel; -> It is a circuit used compare the Input voltages of an lop-amp. I soll wou It is an open loop op-amp.

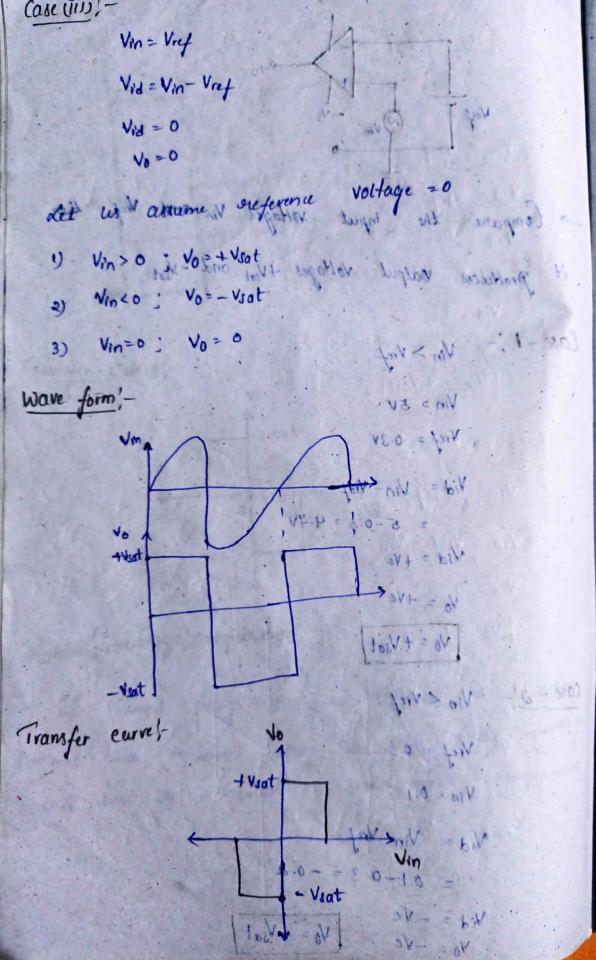
I comparator is also called as square wave generator.

Inverting comparator! If Sinput votage is given to the inverting terminal and refference voltage is vgiven non-inverting terminal then it is called inverting companation Albh pod ou boy holder I wat " | boot = [10] 600 Compare the input voltages Vin & Vref then it produces output either the br) -ve saturation voltage (out) bog in = on (ase -1: - "in > Vet [(1/1) fal > a) Vid = Vref - Vin Vid = 0.8 - 1

Vid = - Ve 10 = - Ve $V_0 = -V_{sat}$ Case - 2 / 0.2 0.3 Vin < Vref Vid = Verf - Vin Vid = 0.3 - 0.2 Vid = 0.1 Vid = + Ve Vo = + Ve franklir Curve: Vo= + Vsat case - 3'-Vin = Vref Vid = Vref - Vin Vid = 0 NON- Sirveting companator V₀ = 0 Let vous rossume vref =0 and a spot of tight to commend and reference voltage tool - 4.00 too for the terminal lives it is called at their for the world 3) Vin = 0 : Vo = 0.







Of-Amp as Voltage negulator; In Voltage negulator - The output voltage Vo Should be independent of the input valtage Variation and load current variation. Show in the below circuit. The sound of the state of the sound of the s of the non-inverting op-Amp is A = 1+ Rf $\frac{V_0}{V_1} = 1 + \frac{R_f}{R_1}$ Vo = 1 + Rt No = (1+ Rt) Vref

Of Viet = 5V Blatupis politic on or electrical the electricial despitation of is be bidepresent of the tiskers = 19/100 to southern If Viet is fixed and Ry = R, the Vo = 2 yet that is the output voltage is fixed at 10 volts, and any variation in un regulated power Bupply tre and -re absorb in the op- comp and output is, constant. the output can be varying the RIRI and Vref remaining all cases is constant. With Zener drade 1-

the above diagram shows the op-Amp as snegulated circust with Zener diode.

Tener diode Should be operate only in the break down renegion (10) inton in hollo so your ristlife the value of the Zener voltage (VZ). Should be less than the output voltage to with with so davia while sussistance and copa ov Sty Valle as VZ = 54 parties devices in Ry = R1 Types of filteria Vo = 2 VZ inter soon poor Vo = 10V - the Tener diode is properly loaded a given fixed voltage (VZ) to the non-inverting terminal - hence, output voltage is fined at 1 2 vz by eliminating ony variations in the output due to supply voltage the and -ve and load current IL

Active filters - A frequency selective electric circuit that passes electrical signals of specified random frequencies and atinudes then Signals of frequency Outside the top bond 18 called as active filters. - filters may be called as active (or) passive according to the presence (on) absence of an active devices respective Il active filters: op-amp ist used as on active device while nesistance and capacitense were used as passive device. 15 = 2h Types of filters! in Low pass filter 2 / C = 0/ is the pass filter proposed in the way with I dow pass filteriza but a (1) apollow bank It can allow bonly below cut-off frequency and originat the above cut-off frequency. - the active fitters may be off different orders - A first order active filter consists of single RC Network connected to input terminal of the op-amp.

Network connected to the input terminal of the op mp

To the ree at some term meat degral.

So the ree at some terminal of the op mp

So the ree at some terminal of the meat degral. Henre to surport so yero I de december.

Successing the frequency espacitive occitence is decrember $Xe = \frac{1}{p_0}$ $xe = \frac{1}{p_0}$ xe =- Capacita neactonce -) At Now frequency capitles appears as a open. - As the frequency increases capacitous rectance is increases then decreases in the Voltage input. -> there to be the value of the Signal frequency at which the o/p decreases to 0-407 times its dow frequency value $f_c = \sqrt{\lambda Rc}$ 407 is which broad Band filler is the rembination of wars pass filter - St can allow only above cut-off frequency and sugar the below cut off frequency.

A first order active filter consists of Jingle Re Network connected to the input terminal of the op-Amp capacitor is infinite and it blocks the input Signal Hence the output is Zero. - Increasing the frequency capacitive meactenes is decreases and output is Increases. output 18

Re Manuel Color of increases then decimates in the stage imput the for the nature of the opening technical as to top decrease to the day of the Band filteri-- Band filter is the combination of row pass filter and high pass filter.

It can allow only certain band of frequencies. and element energet the enemaining band of the frequency.

? It can allow the frequency between fe, and fez and oreject the below cult-off frequency te, and above cut-off frequery for fc, - Lower cut-off frequency fer tugher cut-off frequency. VIN CI W OVO

R2 WOOD OVO

R3 WOOD OVO

R4 WOOD OVO

R5 WOOD OVO

R5 WOOD OVO

R5 W (6) souls and 6. 10 (1 proof) and the constitution of the constitu 555-Ic Timer, de lessas > 34 times is an integrated circuit used in Timer pulse generation and asteat ostilations applications It is used to provide the Time delay. It is used to provide the decay.

It is on 8-pin Ic developed by using c-mas technology - A 555 timer can be used to modulate the signals and create accurate clock signals, create pulse with modulated signals.

pin diagram of 555 Ic! it con alow the and siefect the below enti-d AND I S IN VEL HO- THE STORE S 6 threstloud Reset 14 presuper 110- 301 5 contral voltage PINUS (Ground)! - It to connected to the iground the ground reference voltage is low level tox a volts. PINI :- It is a triggering dignal and it is inverting input of comparator two. PINTIL! the output is dry to a appointmately 0-707 below ver lon ground. PIN IV)- 2+ 13 a oneset signal, active low signal (0) PIN I! - supprovides, control accross to the internal voltage pin II) - (threshold) ; It is a non-inverting sinput of comparated 1 prochange); open collected output which may discharge a they capacitor b/w intervals.

PINI VIII (Vei) - 9+ 11 a +ve dupply voltage 6100 the 3N & 15V depending upon the variants. Varioations. functional block diagram of 535 Ic! ANT SWOOL S QUELLE ON S QUELLE > 555 Ic timer consists of the two comparados, 1 flipflop, I tronsistor.

The inputs to the comparator, is V theshold and 2 vcc and its output is voil When it is connected to the input to the SK, flip-flop. the inputs to the comparator 2 veg and its output is to 2 then it is connected to the input of Set flip flop conert will be acts a translite is in solventing. Will approprie the ten of the I capaco in the

- the outputs of SR flipflop is 6 and Q. -, the 555 timer Ic can be taken at P. of the connected to the base of the transistories Working! case OF a) JTHR > 2VCC b) VTR4 > VCC Vid = Vcc - Vrea Vid = VTHR - RVec Nide Zo + Vermo Vo1 = +ve Voz = - ve 1000+ 1 , godf 7 0} V01 = + ve - Vol = 1, and Vo2 = 01 then simputs to the se fleptlog If S=1, R=0 then dR-flip flop is in Set condition? 17 Sz1, R=0 that 9 = 1 and 9 = 0 00 of is the 555 timer output that is Zero. toque -> Q is connected to the base of the transition then transistor is in saturation sugion. It will be acts a short erreult and a with its connected to the ground they output is Zero. then capacito is Zero.

case 2)
a) Vane 2 2000
Vid = Vthe - 2 vcc Vid = Vcc Vtre
Cool oppose thanks as of Mid = + ve and small
Voi = -ve Vozi = tve seed seed
1 Not =0 Netona tures rigarity not = 17/100 ale si se
- If voi = 0 and vox = 1 then are the inputs of SR-fliptlop
then its outputs we good of
- the 555 timer Ic output 18 of that 18 1.
The sas times It output 4
of $\phi = 0$. It is connected to the base of the townsistor
then transistor is in eut-off region and it is acts
a open circuit voltage with be existing at the open circuited
terminal. then output =1.
Applications 19
-> Tempagrature, measurement and control devices
Traffic signal light control circuits.
_ It is used to make an alarm circuit.
as a sea to senate circuit.
- used in digital counter circuit. Aims delay generation, voltage controlled
- pulse generation, time delay generation
osillations, frequency division applications.
- All electronic projects.

Square wave generator.

It is also called as schmitt trigger. -> If positive feedback is added to the comparator Circuit then it is det to be Schmift trigger (or) Square ware generator. -> It is also called Re-generatic comparator. dopt of to main the want to con pure a son for I a to the second of the secon 14 count of to see in the state of the transition then transition is in the region and it is not - Some position of the output will go back to the Input NOW, voltage dividend onle at VT = VOR2 remposentione, measurement and central devi Vin > VT Mounts tentres trigil tonges settour Vid = VT - Vin

Vid = VE Vid = -ve Vo = - ve times estants letyle of best to pulse generation, time deling track a time of the

case Tij - Vin < Vi 900 - 900 - 12 (+101) = 14.9 = 14 = 14.0 = 14 Vid = +ve Vo = + Vsat thersold and collect -> if vo = + vsat then therield vo Hage is called as upper thersold potential. Vo = + Vsat VT = R2 (+ Vsot) E-= quil RITRL B-= all Example, the VUTPO = R2 (+ Vsat) - If vo = - Vsat then thereold voltage is ealled as lower thesold potential. Vo = - Vsat $VT = \frac{R_2}{R_1 + R_2} \left(-V_{\text{sat}} \right)$ $V_{LTP} = \frac{R_L}{R_1 + R_L} \left(- V_{salt} \right)$ -> the difference between the appar thersold thersold potential is ex potential and Lower called as "Hysten's?

VH = VUTP - VLTP N > M VH = R1 (+ Vsat) + R1 (- Vsat) VH = Rz (2 Vsat) is Vin > Vurp ; blokate - Viate V += av (i) Vin < Vorp : Vo = + Vsat to to V = 64 Vo = + Vsat blownt (in) Vin > VLTP ; Vo = - Vsat. John - ov (N) Vin (VLTP) VT = P2 (+ 450+) Vin = - 5 and VLTp = -3 Example - iii, Vulp = Pr (+ Viat) NON VIDE VETP - Vin = -3-1-5) Vo = - Vent + then thersold voltage mil thereto per + Vsat