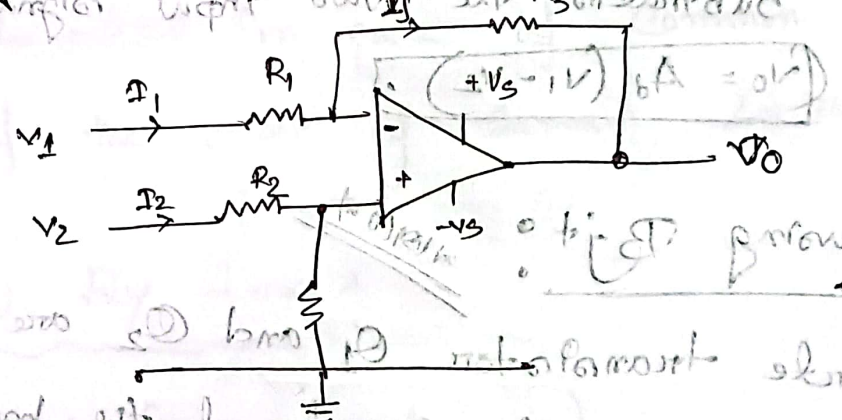
Leg 7

Amplifier.

Amplifier is a device that is used to amplify the difference in voltage of the two input signals.

Differential Amplifier:



Subtractor Differential Amp example

Characteristics: Def. Amp

- High voltage gain
- Low common mode gain
- High input impedence
- Low output impedance
- Low current.

Operation Amplifier (OP-AMP)

An op-AMP is a integrated circuit that can be amplify weak electric signals. It can perform some mathmatical function like add, sub, differentiation and integration etc.

Differential Amplifier using op-AMP:

Because, of input configuration all op-amp are considered to be differential amplifier.

- Differential amplifier behaves as subtractor circuit that basically subtracts the two input signals.

$$V_o = A_d (V_1 - V_2)$$

Voltage gain (common mode gain)

$$A_C = \frac{V_o}{V_c}$$

V_o ← output signal.

V_c ← common input applied both input terminal.

CMRR (common mode rejection Ratio).

$$CMRR = \frac{A_d}{A_C}$$

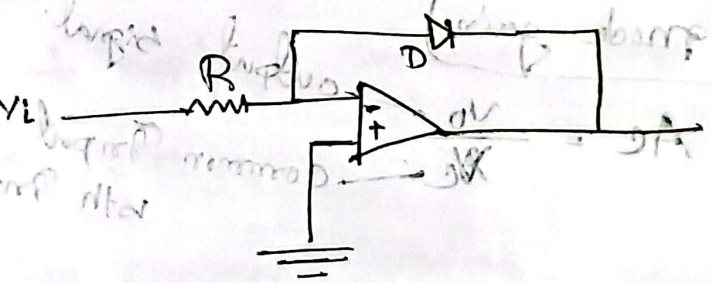
ratio of diff. mode gain to the common mode gain)

- The larger the CMRR the better is the Amplifier

Logarithmic Amplifier

- Log amp also called, It is an electronic device that produced output that is (≈) of Logarithm of the applied Input.
- two Circuits here { Diode and op-amp
  BJT and op-amp.

Log-Amp using diode and op-Amp:



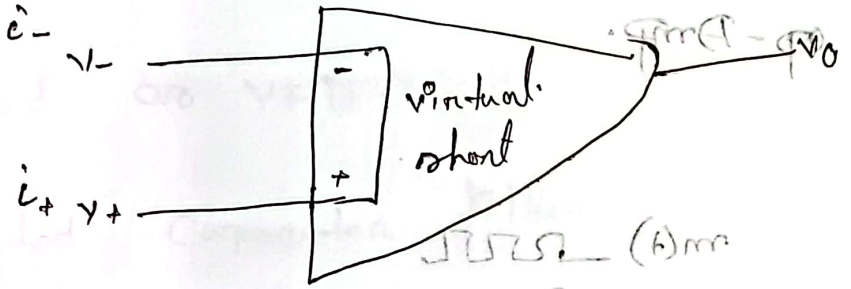
here op-Amp Ideal and Negative feedback is present. voltage of Inverting (V_-) and voltage of non Inverting terminal (V_+) are equal. according Virtual short concept

$$V_- = V_+ = 0V$$

Op-Amp Ideal rule. both terminal Op-Amp. Zero.

Log amplifier using diode and op-Amp.

Since, $V_- \approx V_+$ for feedback application, it appears that the 2 op-Amp terminals are shorted together.



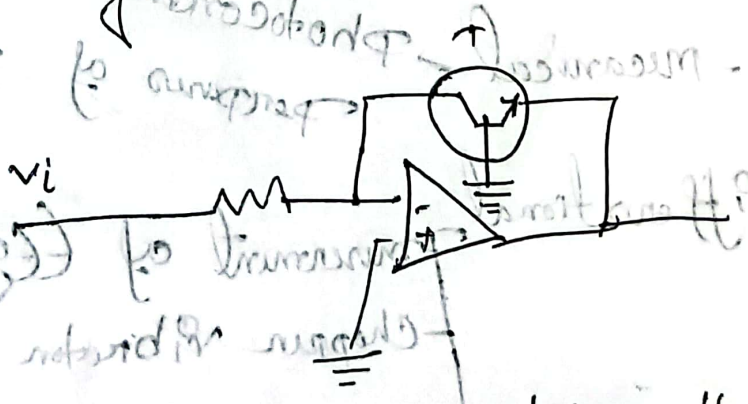
$$V_o = -\eta V_T \ln \frac{V_i}{I_o R} \quad \left[\text{if } V_i > 0\right]$$

180° phase difference.

Log amplifier using Diode and transistor

Voltage inverting terminal (V_-) is equal to voltage non inverting terminal ($V_+ = 0V$) according virtual short circuit.

$V = V_+ = 0V$



$$V_o = -\eta V_T \ln \frac{V_i}{I_o R}$$

current of emitter base junction

Display Device

- Display Device are the output devices for presentation of information in image form.

Most commonly used display along with MC are LEDs LCD, GLCD, and 7 segment displays.

#Display using LED (Light emitting diode

Used for indication of alarms, inputs and timers.

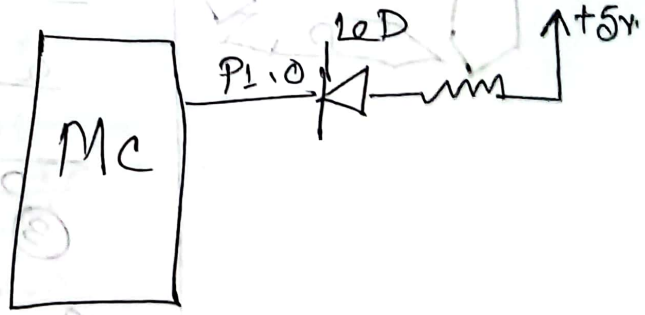
two types

active high Logic

It means that LED will on Port pin 1 when 0 off

Active Low Logic

It means LED will off pin go 0 1 on when Pin "0"



Segment LED Display.

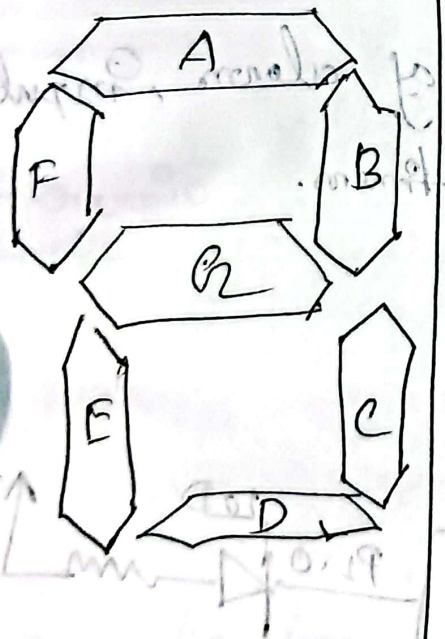
It can use for displaying digits and few characters.

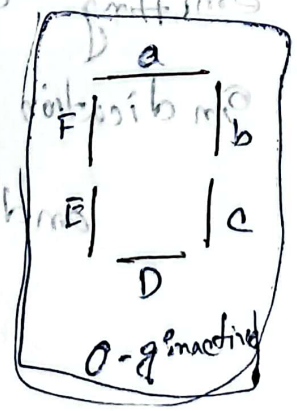
- Display 0-9 digital ~~characters~~ information.
- Available for common anode and cathode mode

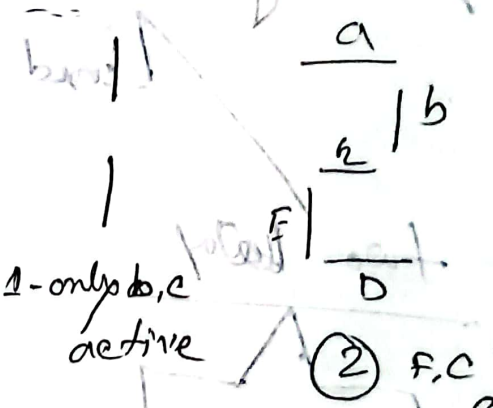
anode → positive terminal

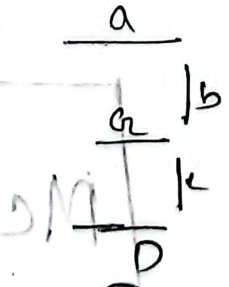
cathode → negative terminal

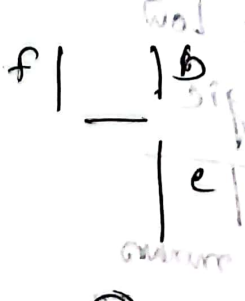
7 Segment LED

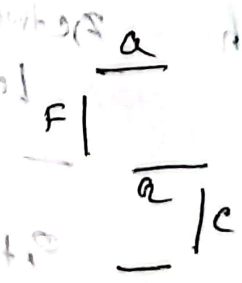


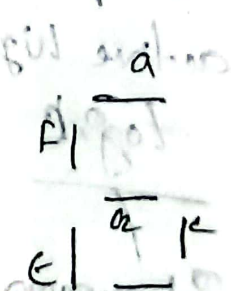


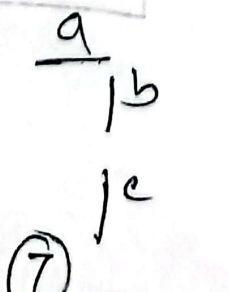


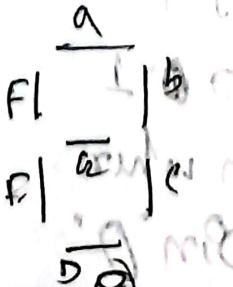


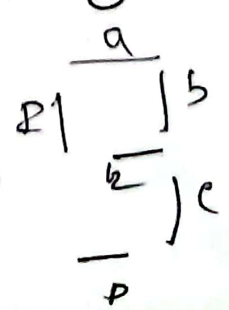








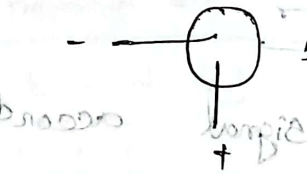




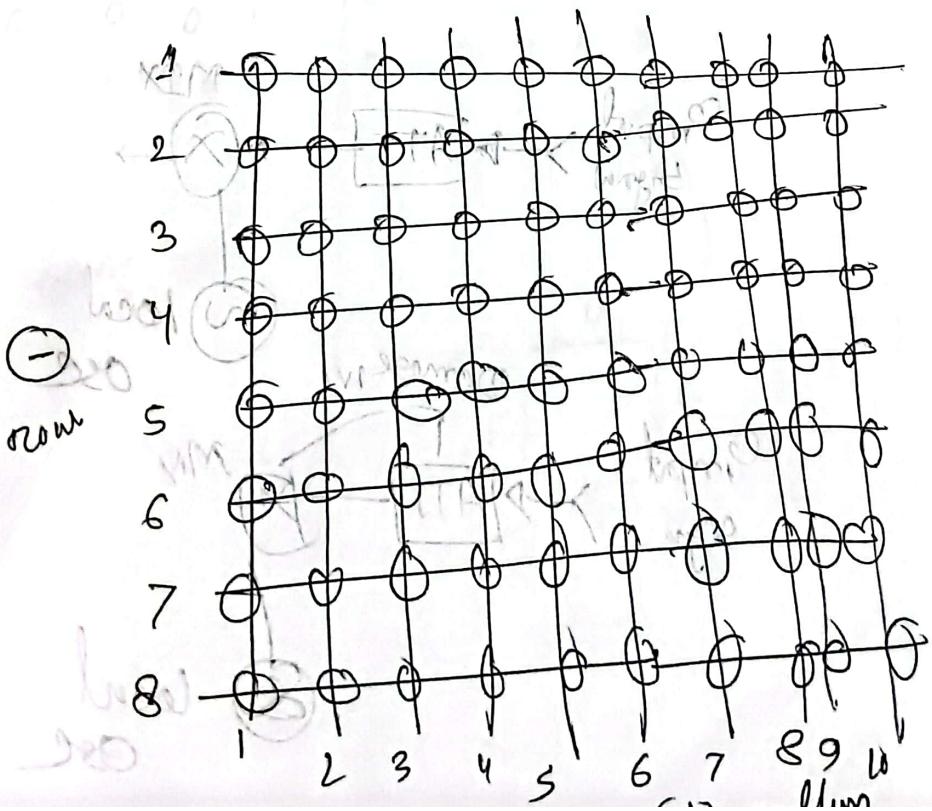
Dot matrix LED Display

Contains grp of LEDs as a 2 dimensional array.

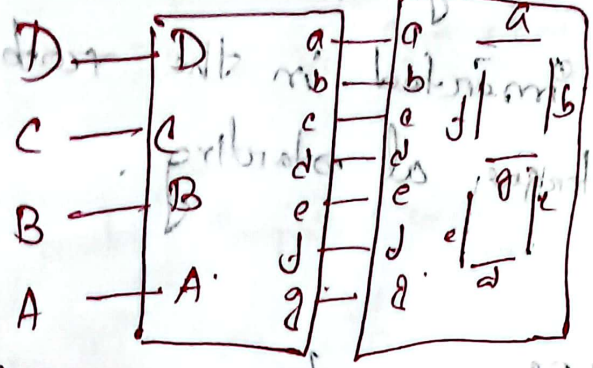
- It can display char and grp of char
- By using dot we can reduce number of Pin.
- Addressed by its row and collumn number

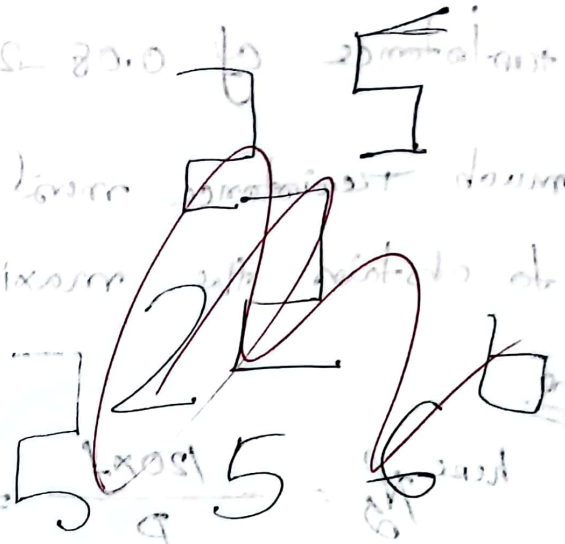


Dot Matrix



7 Seg Display





#Truth table
anode
cathode

Truth table cathode Common

Num	A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	0	0	1	1