CMR INSTITUTE OF TECHNOLOGY

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Internal Assesment Test - II

Sub:	Electronic Principles and Circuits							Code:	BEC303
Date:	18/1/2024	Duration:	90 mins	Max Marks:	50	Sem:	3rd	Branch:	ECE

Answer Any FIVE FULL Questions

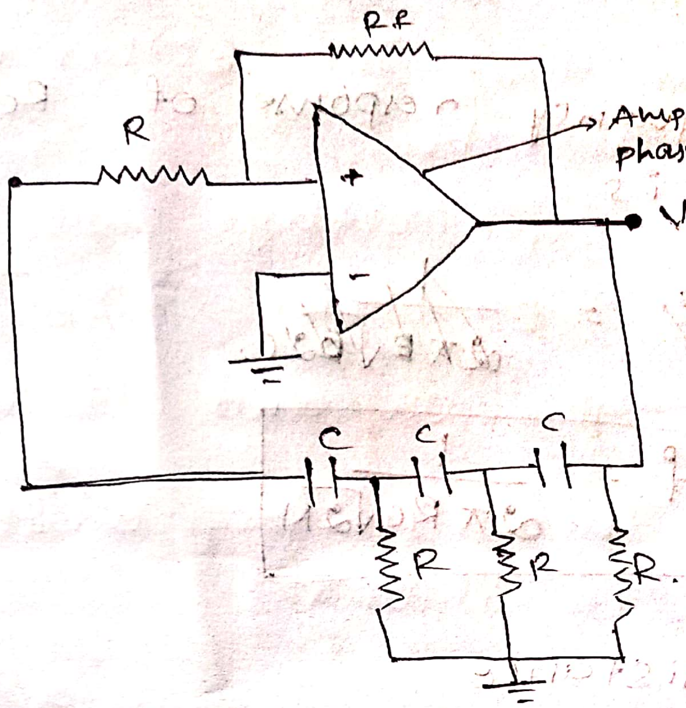
		Marks	OBE	
			CO	RBT
1	Explain the circuit diagram and working of RC phase shift oscillator	10	CO3	L2
2	Explain the working of Astable multivibrator using 555 timer with internal diagram	10	CO3	L2
3	Explain the circuit diagram and working of crystal oscillator.	10	CO3	L2
4	Explain the operation of the first order stages for both LPF and HPF active filters	10	CO4	L2
5	Explain VCIS and ICVS negative feedback amplifiers	10	CO4	L2
6	Explain different Ideal responses of active filter.	10	CO4	L1

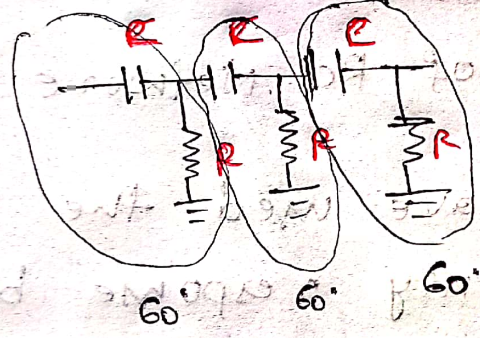
P.T.O

CI CCI HOD

IAT-2.

(i) R-C phase shift oscillator.





→ the phase shift oscillator uses the 3 Log circuits (R-C)

→ the Amplifier produces the 180° phase shift and 3 Lag circuits produces the 180° phase shift. at some high frequency to get a open Loop phase shift 0°

→ if the AVB is greater than 1, then the oscillator starts working.

→ it cannot be adjusted over the high order frequencies.

→ the frequency response of Rc phase shift oscillator is

$$f = \frac{1}{2\pi RC\sqrt{2N}}$$

where,
R → Resistance
C → Capacitance
N → Number of Rc Networe.

in the fig.1 we have used the 3 R-C network then the frequency response becomes.

$$f = \frac{1}{2\pi RC\sqrt{6}}$$

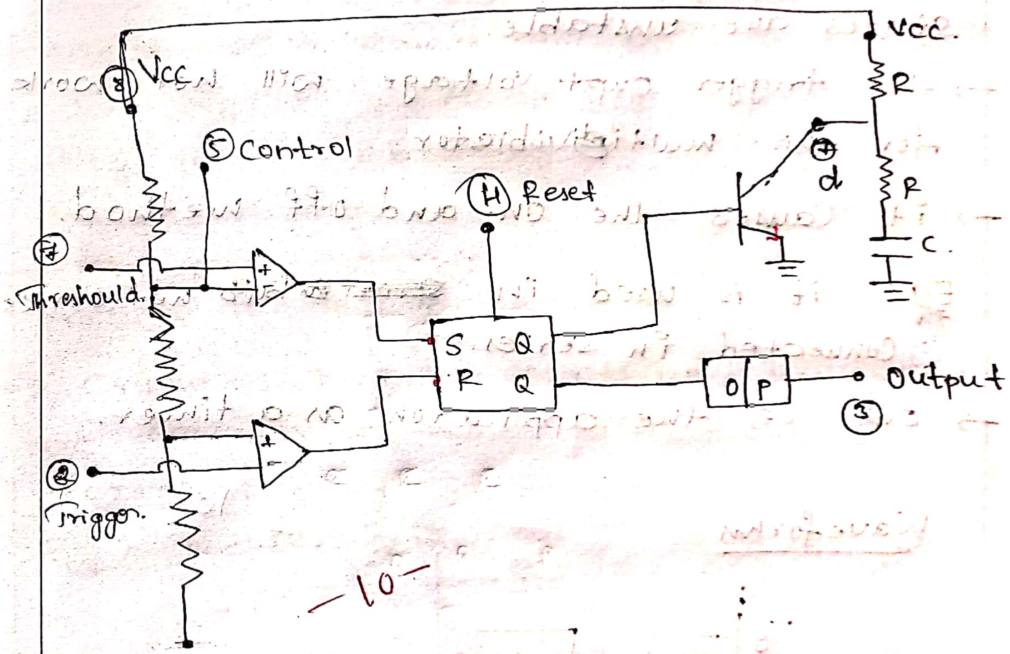
-10

2) Multivibrator

→ multivibrator is a device which produces the square triangular pulse wave form called as non-linear operation employ building

block circuit is known as multivibrator.

Astable multivibrator.



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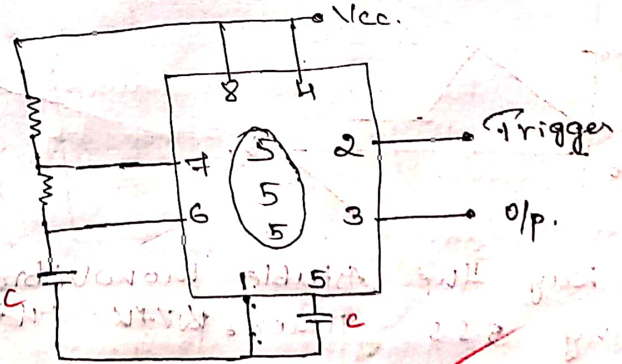
555 - internal diagram



→ the Astable monovibrator has both the unstable states. ~~which~~.

→ which means that the either of the states are unstable.

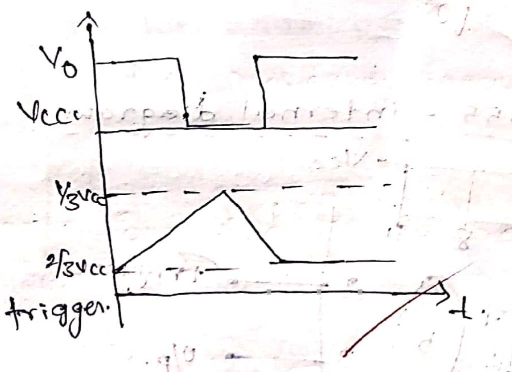
→ the trigger output voltage will not work for this multivibrator.

→ it causes the on- and off method.

Eg: it is used in ~~[illegible]~~ bulb networks connected in series.

→ one of the application as a timer.

Waveforms



by this way the Astable monovibrator works using 555 timer.

3) Crystall oscillator.

→ piezoelectric effect

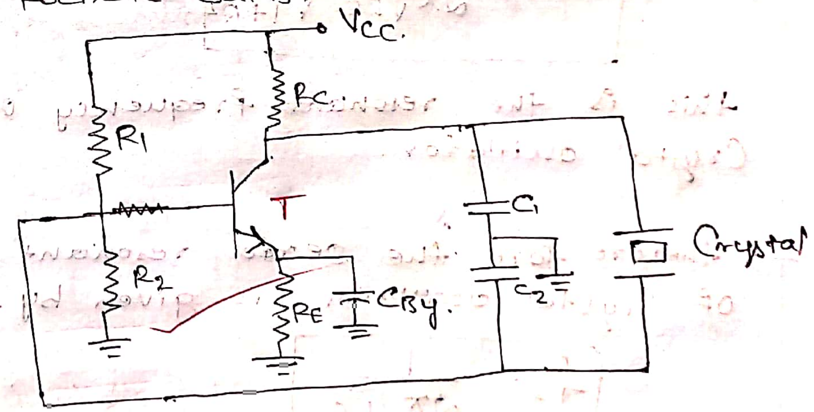
⇒ there are some natural elements on the earth which obeys ~~causes~~ the piezo electric effect.

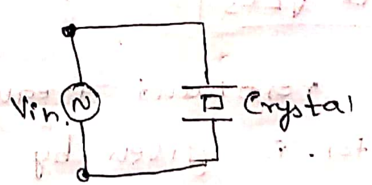
→ when we apply AC voltage Around them they starts vibrating at frequency of Applied voltage.

→ when we mechanically force them they produces the AC voltages.

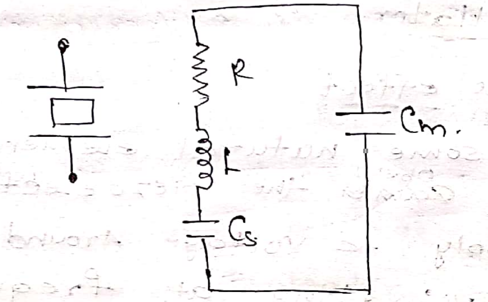
→ Crystals, Rochelle salts and normal line are the devices which ~~allows~~ obeys the piezoelectric effect.

Eg: Rochelle salts.





series parallel resonand frequency.



R → Resistance of Crystal

L → electrical equivalent inductance

C_s → Crystal Capacitance.

C_m → mounting Conductance of Capacitor

$$f_r = \frac{1}{2\pi\sqrt{LC}} \cdot \sqrt{\frac{Q^2}{1+Q^2}}$$

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this is the resonant frequency of the Crystal oscillator.

→ therere fore the series resonant frequenly of Crystal oscillator is given by.

$$f_s = \frac{1}{2\pi\sqrt{LC_s}}$$

→ the parallel resonant frequency of Crystall oscillator. is given by.

$A_v = 1 + \frac{R_1}{R_2}$

$f = \frac{1}{2\pi R_2 C_1}$.

$$f_p = \frac{1}{2\pi\sqrt{LC_p}}$$

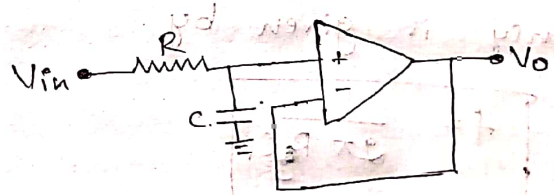
~~where~~ where. $C_p = \frac{C_m C_s}{C_s + C_m}$ //

by this way the Crystal oscillator works.

4) First order stages

1) Low pass filter.

1) non - inverting unity gain Amplifier.



→ for this type of Amplifier the gain is

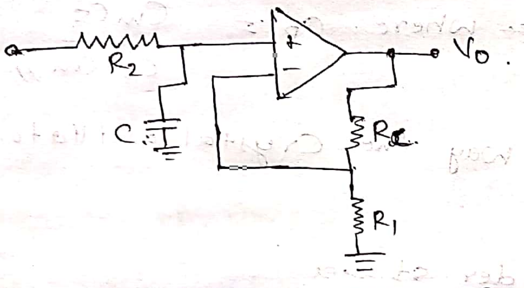
$$A_v = 1$$

→ frequency of this type of unity gain amplifier is given by

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

$X_c = \frac{1}{2\pi f c}$.

ii) Non-inverting voltage gain Amplifier.



→ for this voltage gain Amplifier the gain is

$$A = 1 + \frac{R_1}{R_2}$$

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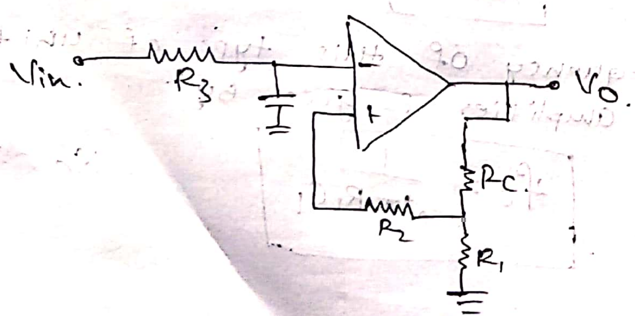
→ frequency is given by.

$$f = \frac{1}{2\pi R_3 C_1}$$

iii) inverting voltage gain Amplifer



→ the voltage gain is given by.

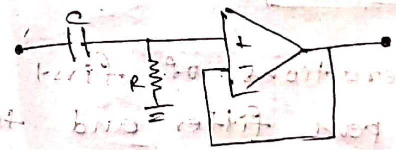
$$A = \frac{-R_2}{R_1}$$

→ frequency is given by

$$f = \frac{1}{2\pi R_2 C_1}$$

High pass filter

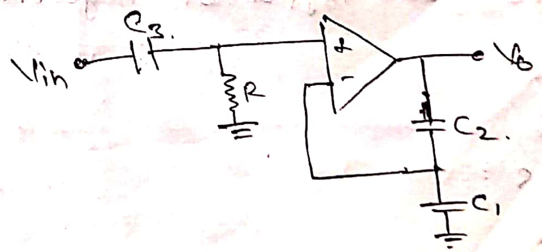
i) Non-inverting unity gain Amplifer



$A_v = 1$

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

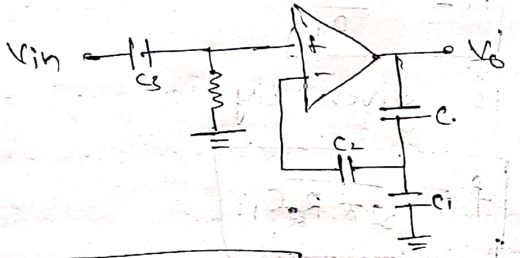
ii) non-inverting voltage gain Amplifier.



$$A_v = 1 + \frac{C_2}{C_1}$$

$$f = \frac{1}{2\pi R_3 C_1}$$

iii) B inverting · Voltage gain Amplifier



$$Av = \frac{-C_2}{C_1}$$

$$f = \frac{1}{2\pi R_2 C_1}$$

=> these the operations of first order stages for both low pass filter and the high pass filter.

5) there are four types of negative feedback amplifier. -10-

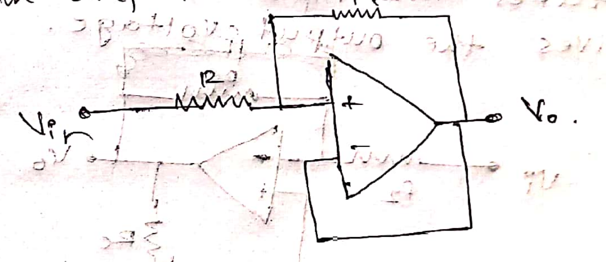
1) Vc Vs
2) Ic Vs
3) Vc Is
4) Ic Is.

Vc Vs
Ic Vs
Vc Is
Ic Is.

① Vc Is (Voltage Controlled Current Source. Amplifier).

→ this type of Amplifier is also called as trans Conductance Amplifier.

→ it Controlls the o/p current current of an amplifier.



the gain of this amplifier is

$$Av = \frac{A_{OL}(R_1+R_2)}{R_1 \cdot (A_{OL} \cdot R_{in})}$$

$$Av = \frac{R_1 + R_2}{R_1}$$

→ the I/p impedance of closed loop amplifier is

$$Z_{in\,CL} = R_1(1+\beta A_{OL}) R_{in}$$

→ o/p imp of closed loop

$$Z_{out}\ C_s \Rightarrow R_1(1+A_{OL}) R_{out}$$ //

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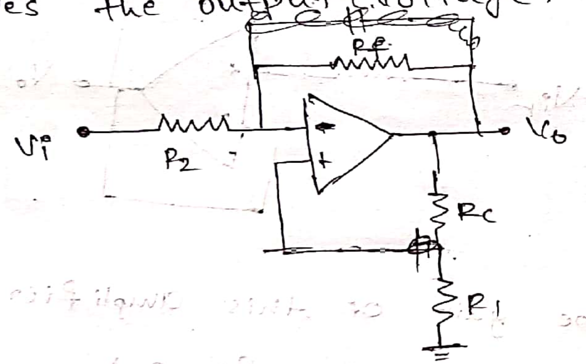
⑨ **Ic Vs** (Current Controlled Voltage Source Amplifier)

→ this type of Amplifier is also known as transresistive Amplifier.

→ it takes the input Current and gives the output voltage.



the gain of this amplifier is given as.

$$A_v = -V_o\ (-I_{in}\ V_{ref})$$

→ the input impledence of closed loop is given by

$$Z_{in}\ C_s = \frac{R_{in}}{R_1+R_2}$$

$$Z_{out}\ C = \frac{R_{out}}{R_1+R_2}$$

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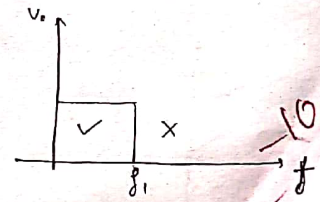
IAT-II

Q6 Ideal Responses for Active filter are:-

→ There are four type of Active filters

(1) Low pass filter
(2) High pass filter
(3) Band pass filter
(4) Band ~~gap~~ stop filter
(5) All pass filter.

① for low pass filter



In low pass filter we get output only when frequency is low. at high frequency we ~~can~~ dont get any output.

$f\downarrow$ → output

$f\uparrow$ → No output

* $f < f_1$ → output condition

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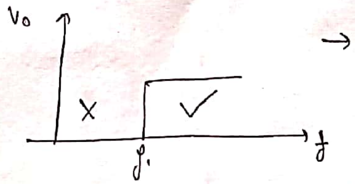
② High pass filter



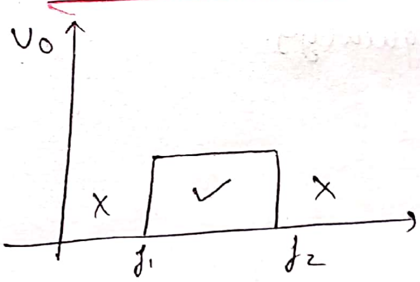
→ In High pass filter we get output after frequency crosses certain threshold then it will gives output.

$f\downarrow$ → No output

$f\uparrow$ → output.

* $f > f_1$ output condition.

(3) Band-Pass filter.



In this type of filter we get output only at selected frequency band we get output → when frequency lies in the range of Band pass filter we get output.

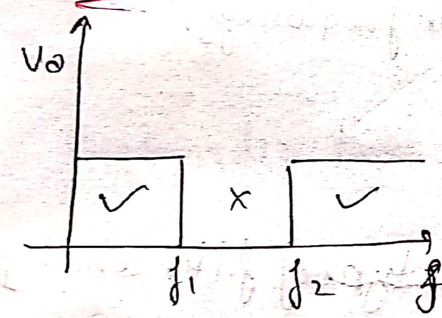
$f_2 - f_1$ = Band width.

$f < f_1$, No output

$f > f_2$, No output

→ $f_1 < f < f_2$ we get output

(4) Band ~~gap~~ Stop filter



→ In this type of filters we dont get any output in selected frequency and we get output in other frequency.

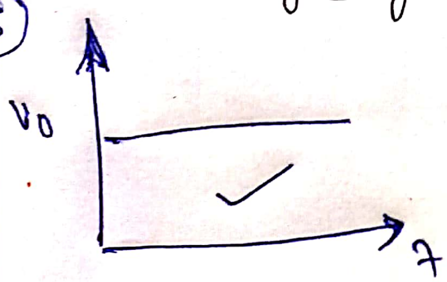
* on certain frequency we dont get any output.

$f < f_1$ output we get

$f > f_2$ Output we get.

$f_1 < f < f_2$ → We dont get any output.

(5)



This filter given o/p for all the frequency.