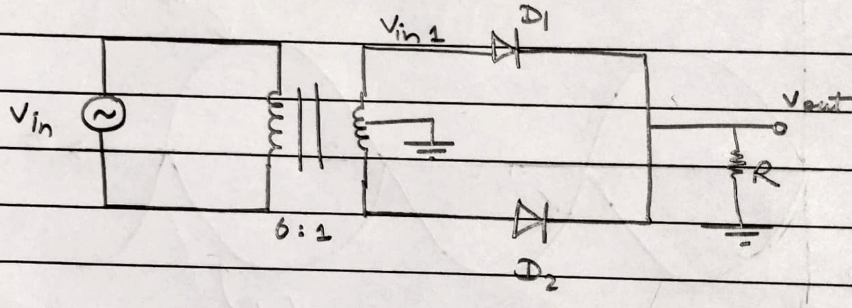
Lab 3

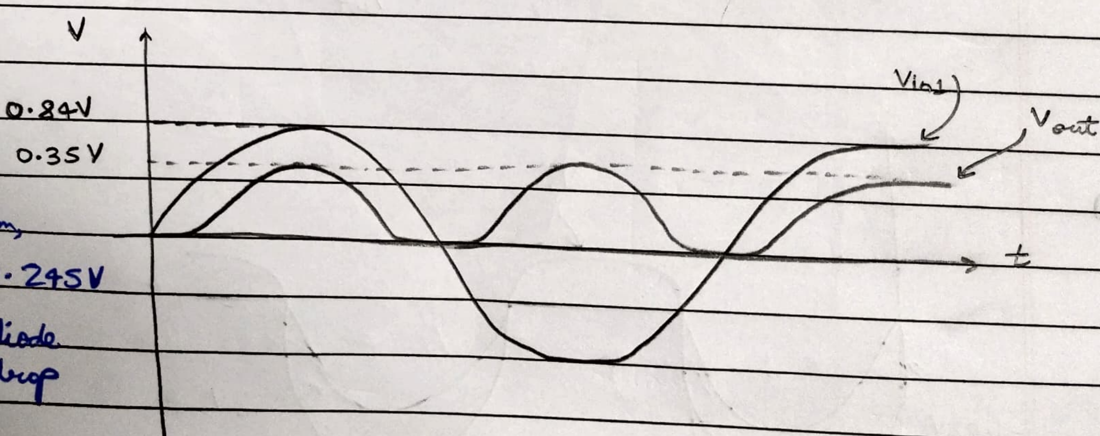
Section - A (Full Wave Rectifiers)

1. Center Tapped Full-Wave Rectifier

Turn ratio calculated = $\frac{20}{3.32}$ = 6.02 ≈ 6

(a) $R = 22\,k\Omega$ 1N4007 diodes





From waveform,

$\frac{0.84 - 0.35}{2} = 0.245V$ = diode drop

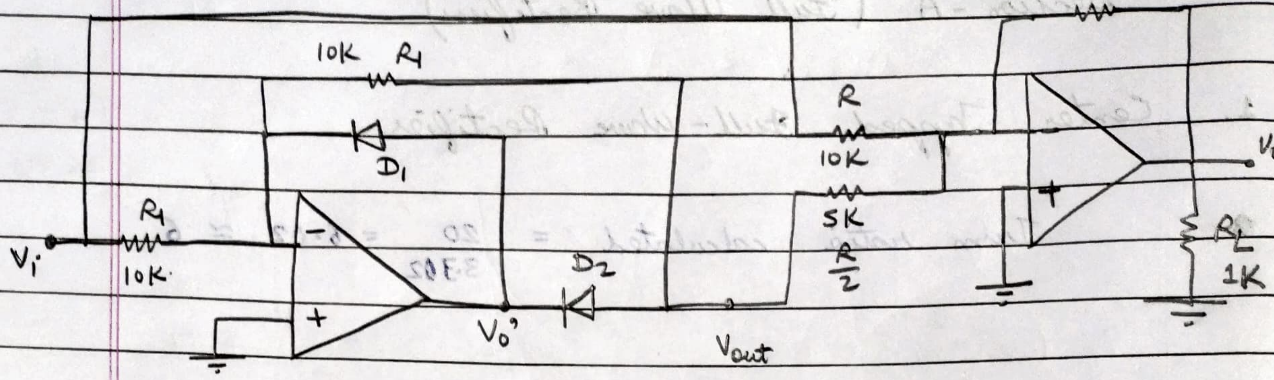
(b) The voltage difference b/w the peak voltage of V_{in_1} and V_{out} is because of the diodes i.e. it is the diode drop.

(c) $V_{ripp} = \frac{V_{in_1} - V_D}{2fRC}$ V_{ripp} (measured) = 8mV

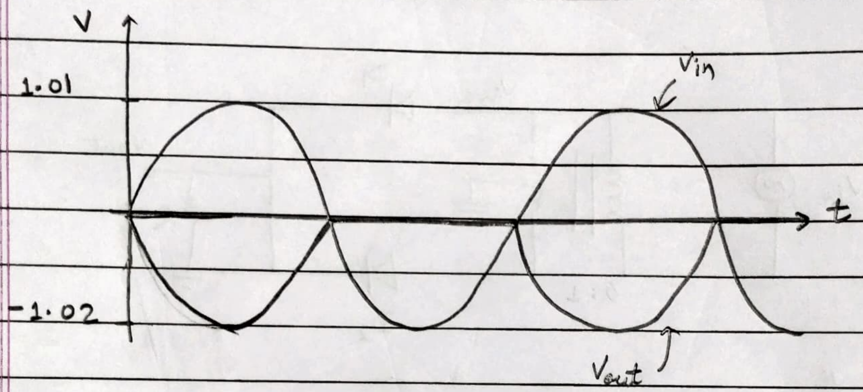
V_{ripp} (calculated) = $\frac{0.8 - 0.245}{2 \times 1.8 \times 22 \times 10^3 \times 10^{-6}}$ = $\frac{0.555}{79.2}$ = 7 mV

1.856×10^3 → frequency

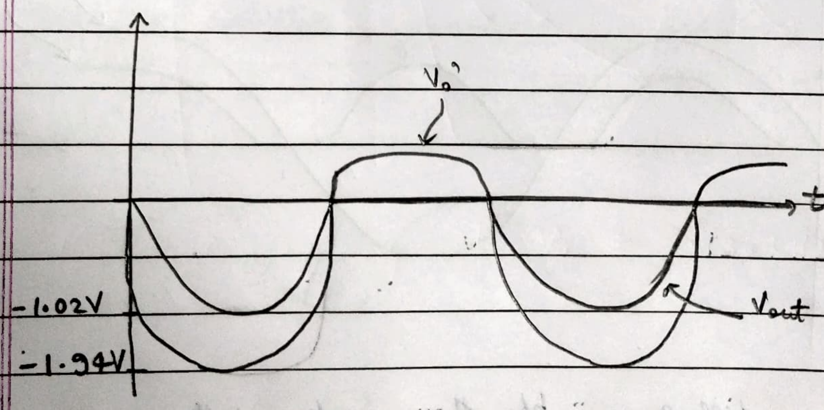
2. Full Wave Precision Rectifier



(a)



(b)



(c) The diode drop vanishes because the opamp maintains a feedback loop, thus compensating and reducing the diode drop.

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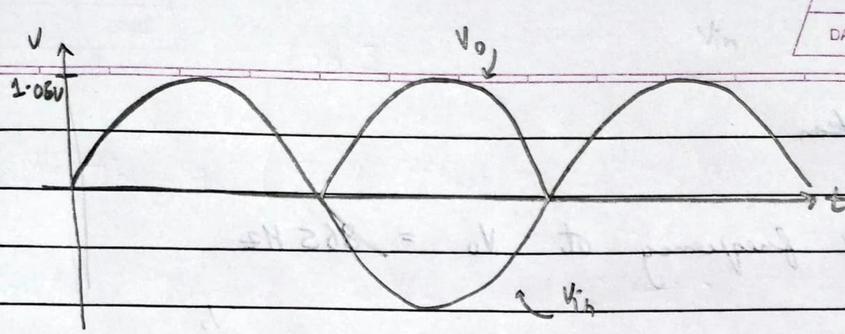
(d)

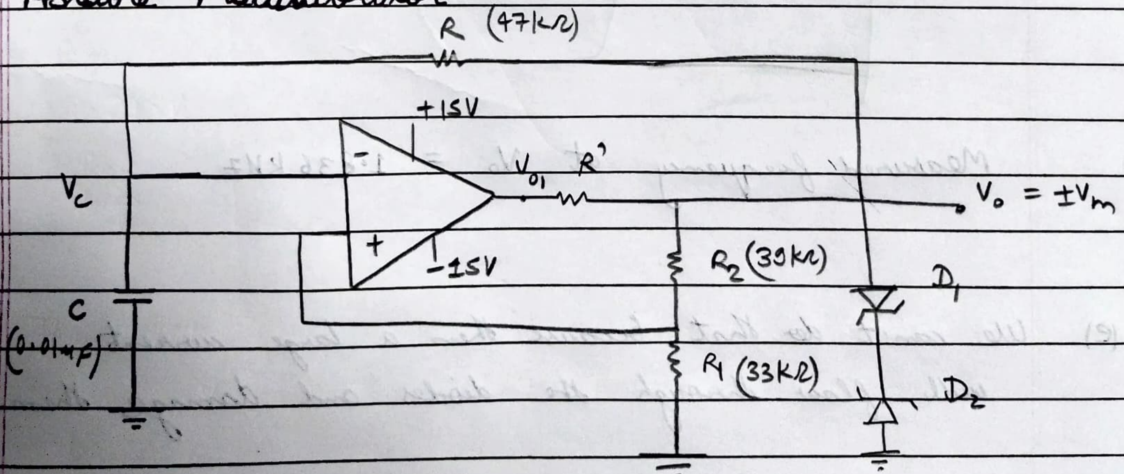


(e) In the Center tapped rectifier, the peak output is slightly lower than input due to the diode forward voltage drop. Whereas in the precision rectifier, the OpAmp compensates for the diode voltage drop. that is exactly equal to the input peak.

Section - B (Multivibrators)

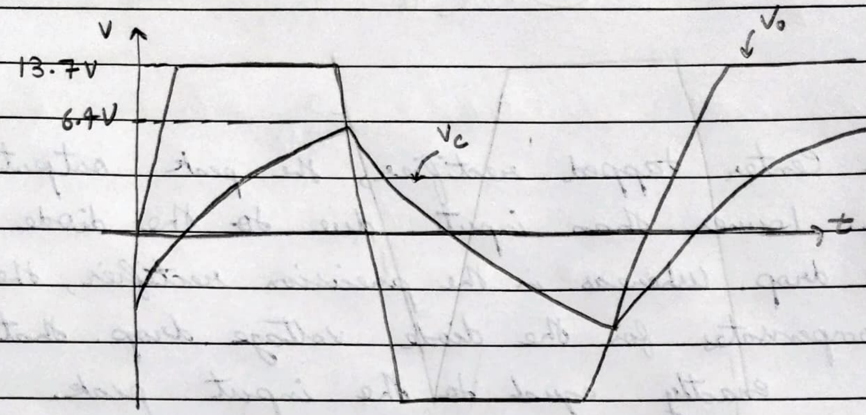
3. Astable Multivibrator

(a)

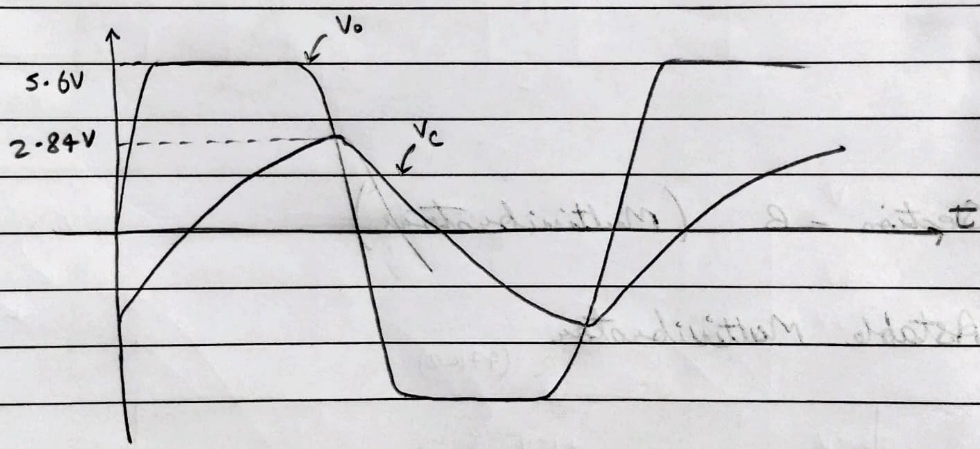


(b) Snap taken

(c) Measured frequency at V_o = 865 Hz



(d)



Measured frequency at V_o = 1.836 kHz

(e) We can't do that because then a large current will flow through the diodes and damage them.

(F) (g) V_{o1} = 26.20 V_{pp} V_o = 11.40 V_{pp}

Frequency at V_o = 1.845 kHz

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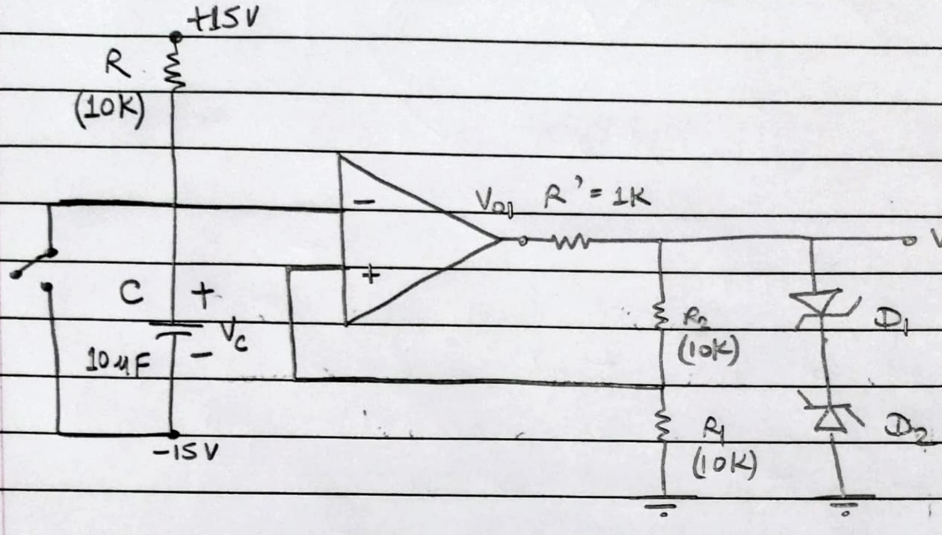
4. Monostable ~~Vibrator~~ Multivibrator

(a)



(b) For pulse width

$$w_c = RC \ln\left(\frac{V_{sat} + V_{th}}{V_{sat} - V_{th}}\right)$$

$V_{sat} = 4V$

$V_{th} = 2.1V$ $\therefore\ w = 10\times10^{3} \times 10\times10^{-6} \ln\left(\frac{4+2.1}{4-2.1}\right)$

$= 116\ ms$

pulse width (measured) $= w_m = 197\ ms$

(c) To generate a PWM.

(d) The circuit is monostable. The values are 0V and $V_{sat} = 4V$.

(e) Snap Taken.

Naman
24/1/25