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M. Sc. Sem III
Paper - MPHY CC-12
Electronics II

X

5.)

VKSU

Monostable Multivibrator

Monostable Multivibrator shown in fig (3), has only one stable state and the other state is known as timing state. If it one output pulse is obtained for an input Pulse. The output pulse width is independent of the input pulse width and is dependent only on the time constant ($R_f C$) as shown in fig (4). Its operation can be studied in three parts :

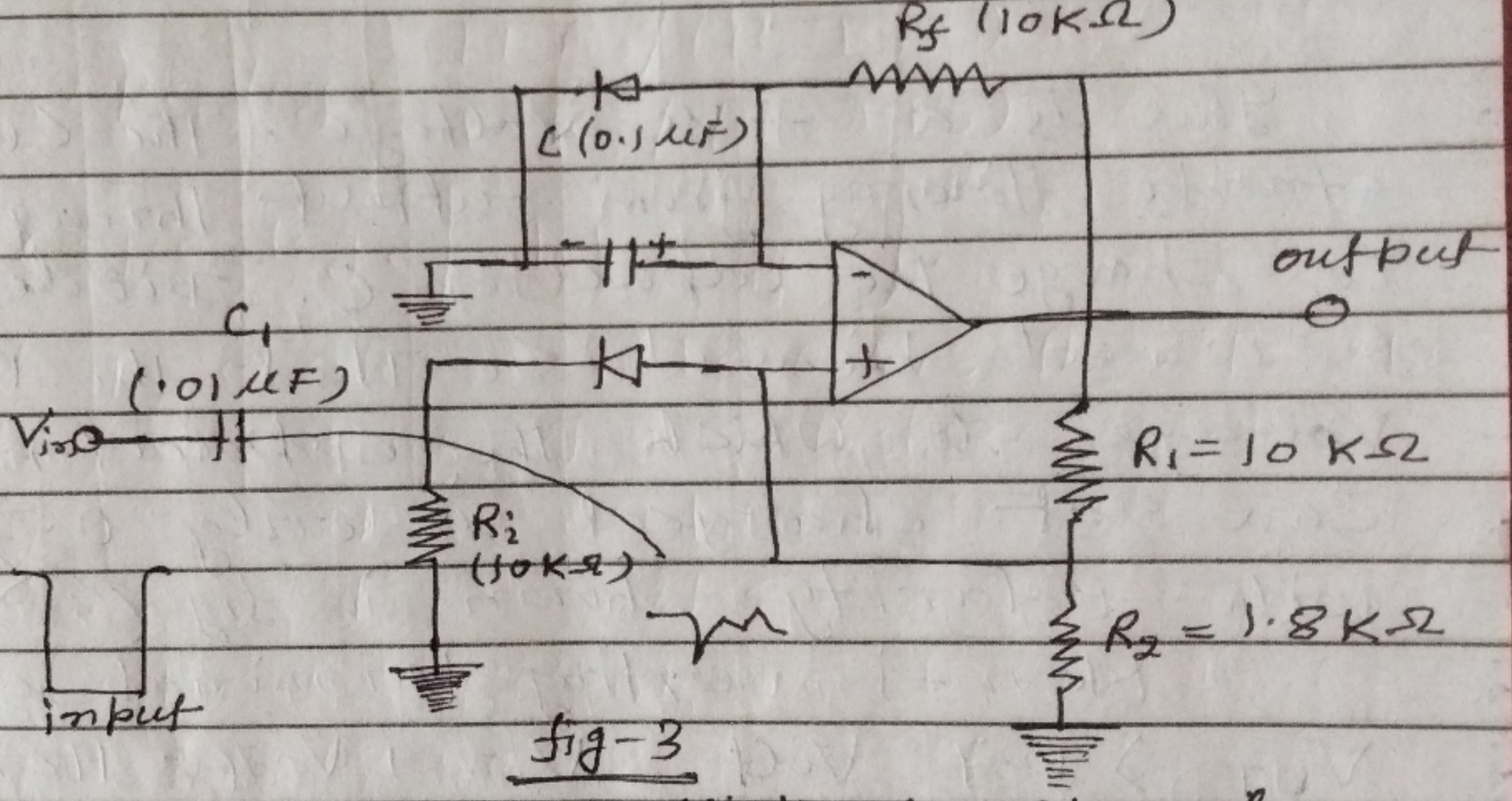

fig-3

Monostable Multivibrator Circuit

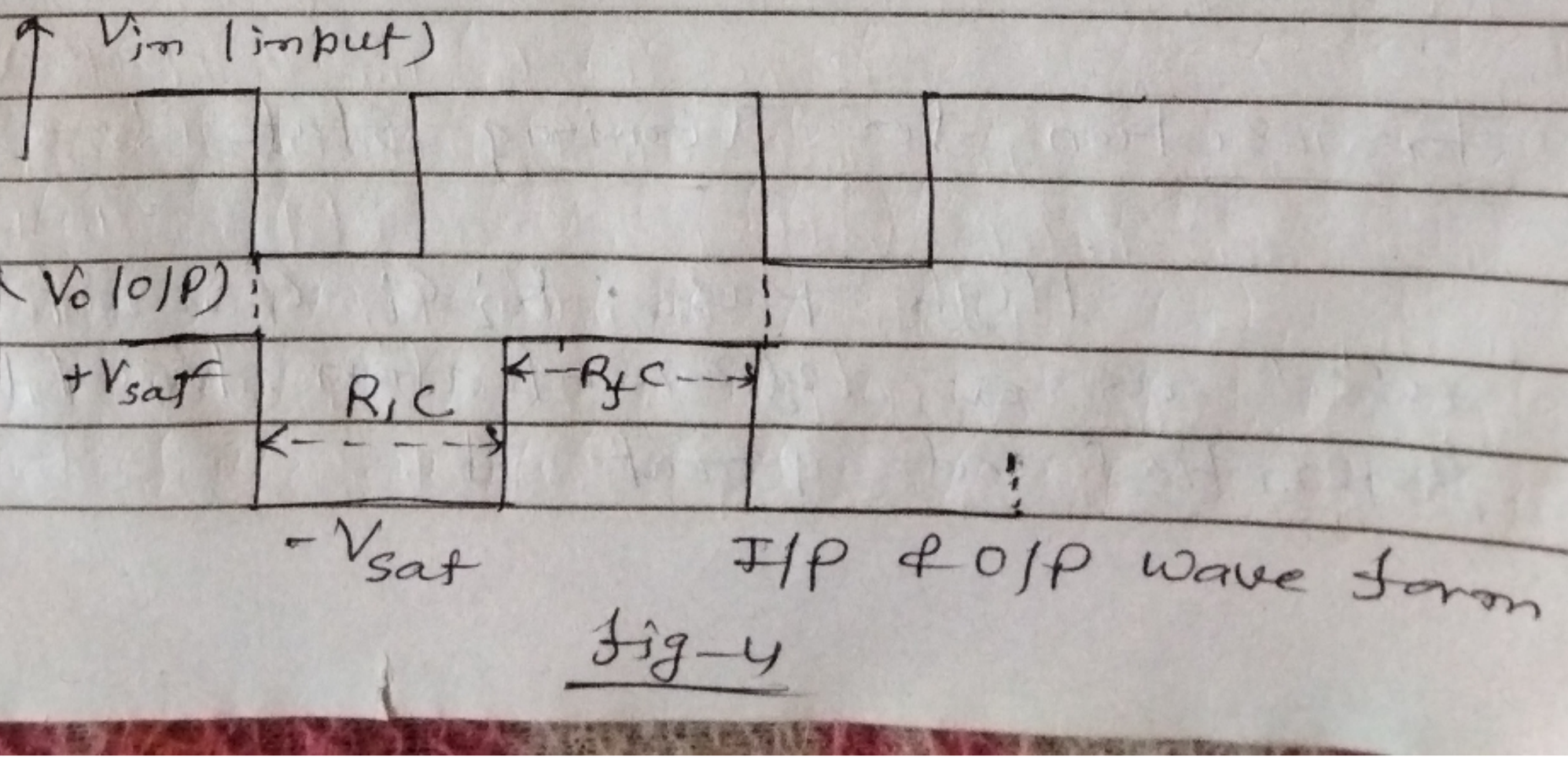

fig-4

VKSU

Stable State :-

Here the output V_o is at $+V_{sat}$. When $V_o = +V_{sat}$, the potential at point A is

$$V_{UT} = \frac{R_2}{R_1 + R_2}(+V_{sat})$$

$$= \frac{1.8K}{1.8K + 10K}(+14 \text{ Volt})$$

taking $V_{sat} = 14$ Volt

This is a +ve voltage. The current starts flowing from output through R_f to charge the capacitor C. Diode D_1 is forward biased so that the Maximum voltage to which the capacitor C can get charged is only 0.7 volt with Polarity shown in fig (3)

Non-inverting terminal is at $V_{UT} > 0.7$ Volt, $V_o = +V_{sat}$. Hence this is a Stable State.

Transition to Timing State :-

High Pass $R_i C_i$ circuit is used as a differentiation to obtain Potential at Point A.

Assuming V_{in} to be enough -ve ($V_{in} = 2V_{UT}$), the voltage at Point A will be -ve so that the output changes form stable state ($V = +V_{sat}$) to the timing state ($V_o = -V_{sat}$)

Timing state :-

It is timing state i.e. output will be temporarily in this state. when $V_o = -V_{sat}$, Potential at Point A is

$$V_{LT} = \frac{R_2}{R_1 + R_2} (-V_{sat})$$

As it is a -ve Voltage, diode D, is reverse biased so that the capacitor starts charging with Polarity opposite to that shown in fig (3), with time constant $R_f C$.

When the voltage across the capacitor C, reaches V_{LT}, then V_o changes from $-V_{sat}$ to $+V_{sat}$. Thus output will be in the timing state only for a time $R_f C$. The Period of output pulse is

$$T = 0.69 \; R_f C = 0.7 \; R_f C.$$