CSE350

DIGITAL ELECTRONICS AND PULSE TECHNIQUES

Lab- 06

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Section- 02

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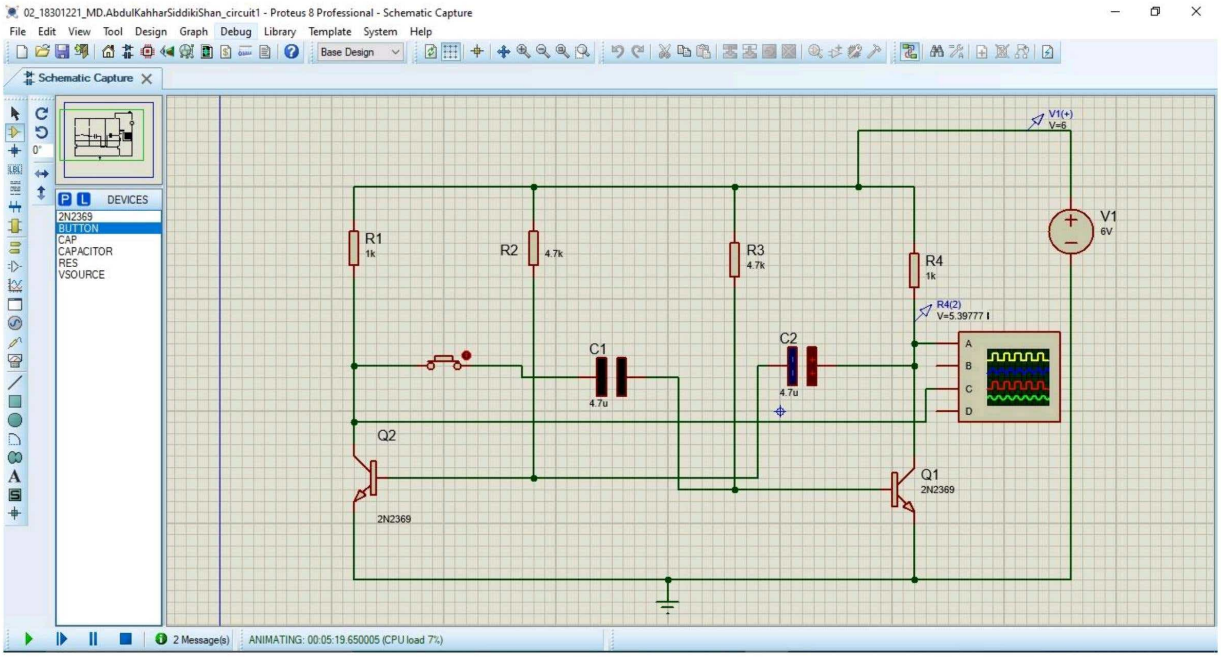
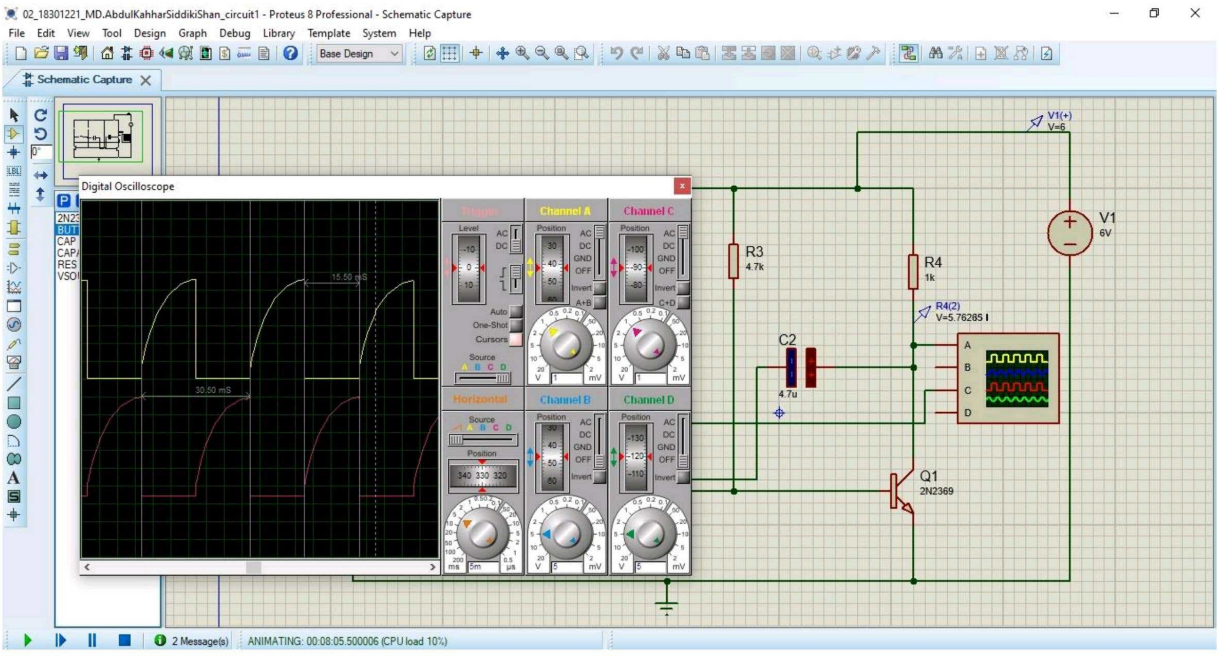
Circuit:





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Calculating the time period with theoretical approach

$T = t1 + t2$

$t_1 = 0.69 * R_3 \times C_1$

$= 0.69 * 4.7 * 4.7$

$= 15.2421$

$t_2 = 0.69 * R_2 * C_2$

$= 0.69 * 4.7 * 4.7$

$= 15.2421 ms$

$\therefore T = t_2 + t_1$

$= 15.2421 + 15.2421$

$= 30.4842 ms$

$\therefore$ The frequency is $= \frac{1}{T}$

$= 32.803878 Hz$

From the proteus oscillation, the time period is, $T_p = 30.50 ms$

So, the difference between proteus data and theoretical data is $(30.50 - 30.4842)$

$= 0.0158 ms$

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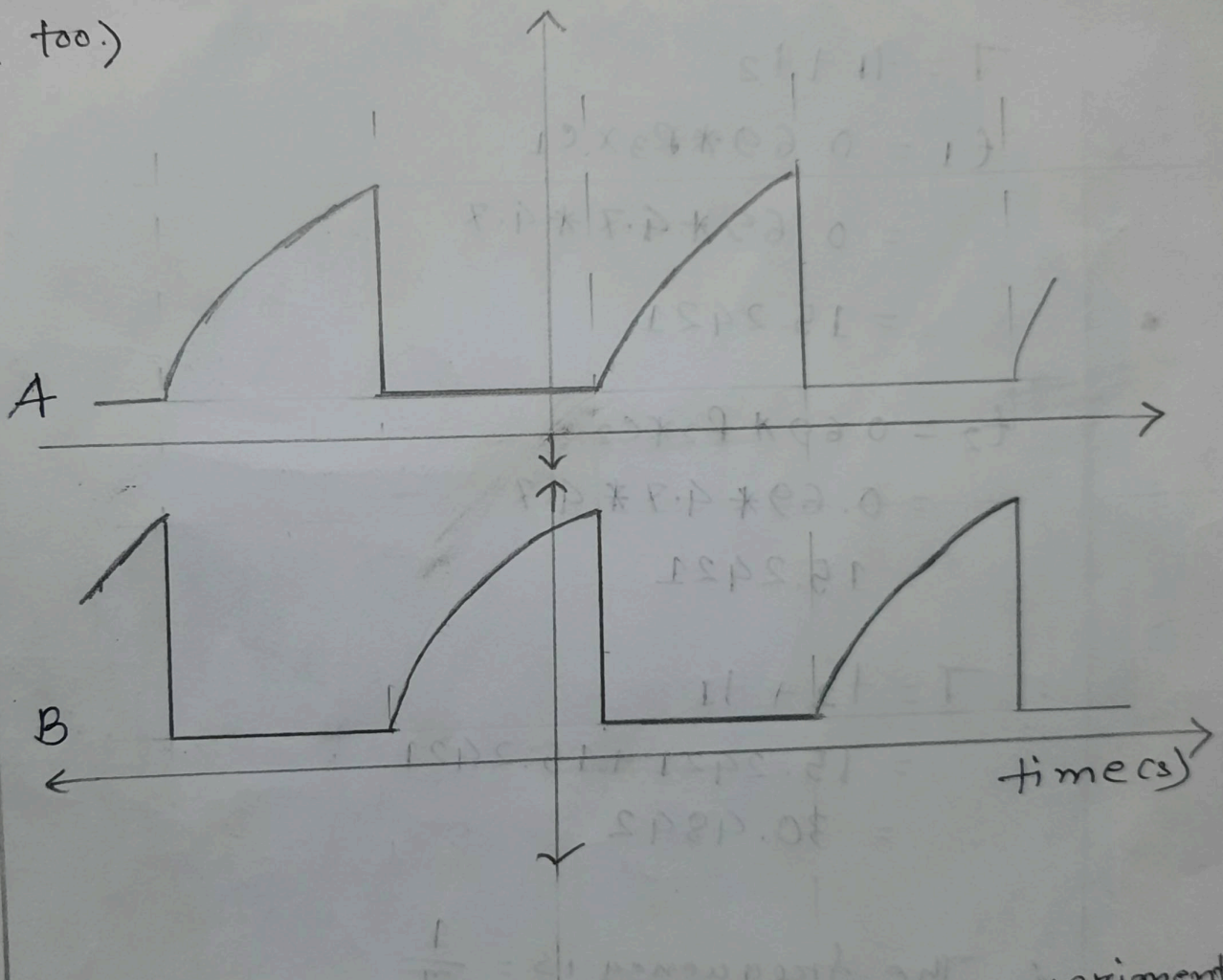
Report:

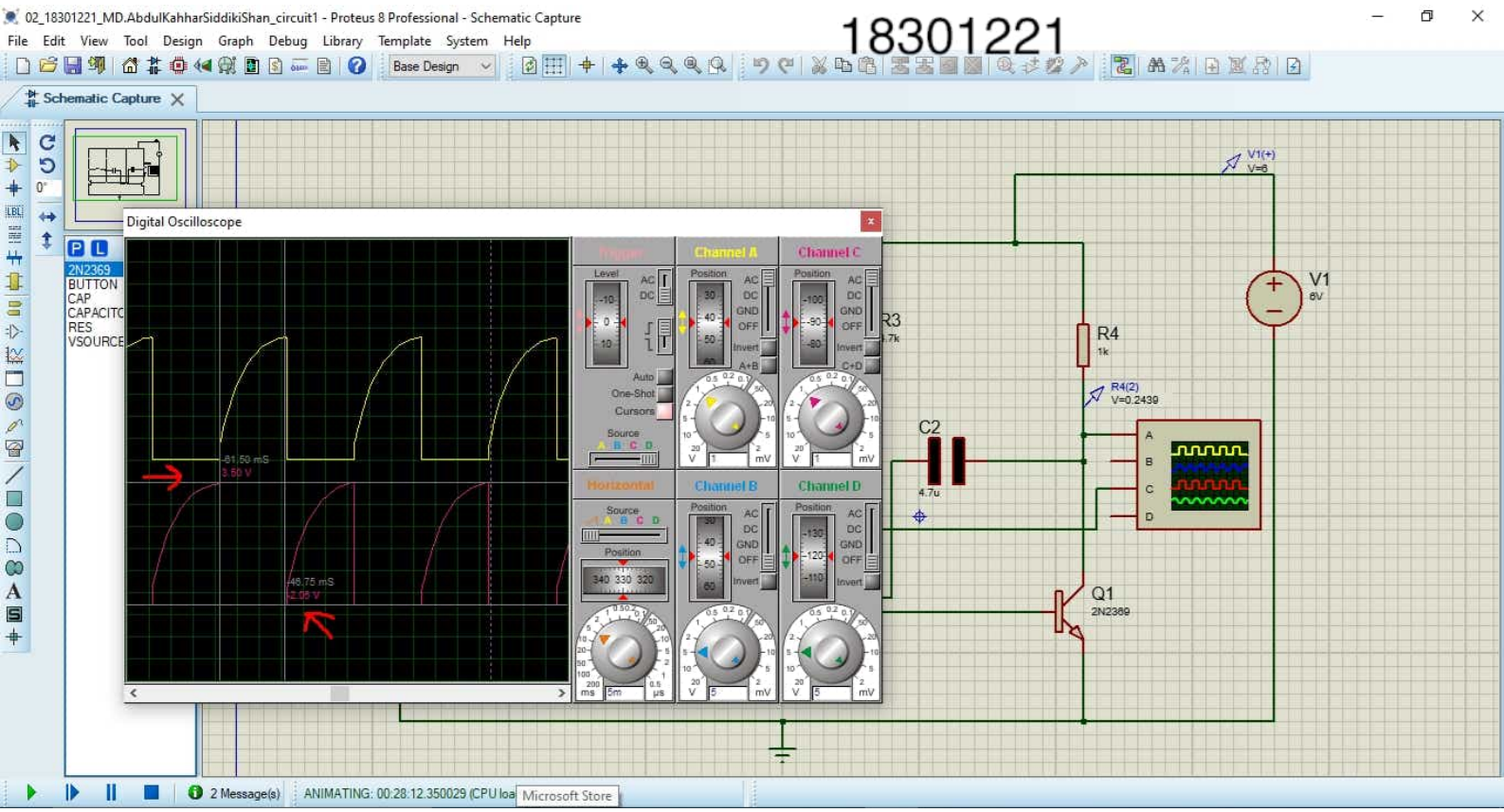
1. Draw the output waveforms that you achieved in the proteus simulation. (Attach screen shot too.)



2. Is there any deviation in the experimental output wave from the desired wave? If so, what might be the reason to that?

→ Yes, there is a deviation output in the experimental output wave from the desired wave. In our circuit the upper peak is 6V and lower peak is 0V and there is difference is 6V. On the other hand,

from proteus oscillation output, we can see that the upper peak 3.5V and lower peak is -2.05V and their difference is 5.55V. So, there is a deviation. The reason of this deviation is in circuit, there was a internal voltage drop which we did not consider in theory.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18301221
File Edit View Tool Design Graph Debug Library Template System Help
Base Design
Schematic Capture
Digital Oscilloscope
2N2369
BUTTON
CAP
CAPACITO
RES
VSOURCE
Trigger
Channel A
Channel C
Horizontal
Channel B
Channel D
Level
Position
Source
Auto
One-Shot
Cursors
Invert
-81.59 mS
3.50 V
-46.75 mS
12.08 V
V1(+)
V=6
V1
6V
R4
1k
R4(2)
V=0.2439
C2
4.7u
R3
7k
Q1
2N2369
2 Message(s)
ANIMATING: 00:28:12.350029 (CPU loa
Microsoft Store

3.1

3.1

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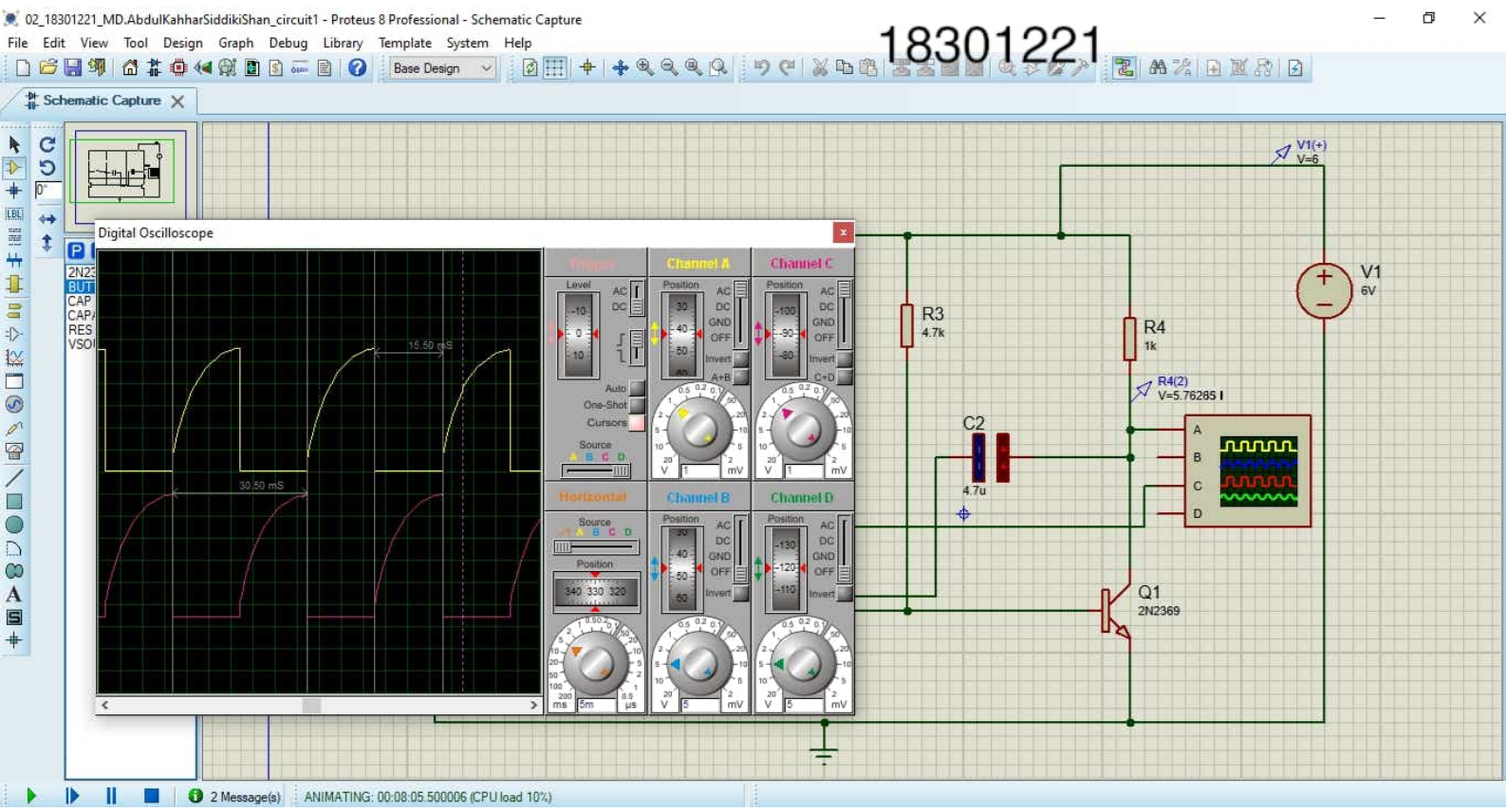
3. Is the time period of the experimental wave is similar to the calculated wave.

→ From theory, the time period $T_t = 30.4842$ ms

from the experiment, it is $T_e = 30.50$ ms

There is a little difference from the theoretical value to the experimental value. The difference is $(30.50 - 30.4842) = 0.0158$ ms.

As the difference is to small, we can ignore it and we can say that time period is similar in both side.


02_18301221_MD.AbdulKahharSiddikiShan_circuit1 - Proteus 8 Professional - Schematic Capture
18301221
File Edit View Tool Design Graph Debug Library Template System Help
Base Design
Schematic Capture
Digital Oscilloscope
Trigger
Channel A
Channel C
Horizontal
Channel B
Channel D
15.50 mS
30.50 mS
V1(+)
V=6
V1
6V
R3
4.7k
R4
1k
R4(2)
V=5.76265
C2
4.7u
Q1
2N2369
A
B
C
D
2 Message(s)
ANIMATING: 00:08:05.500006 (CPU load 10%)

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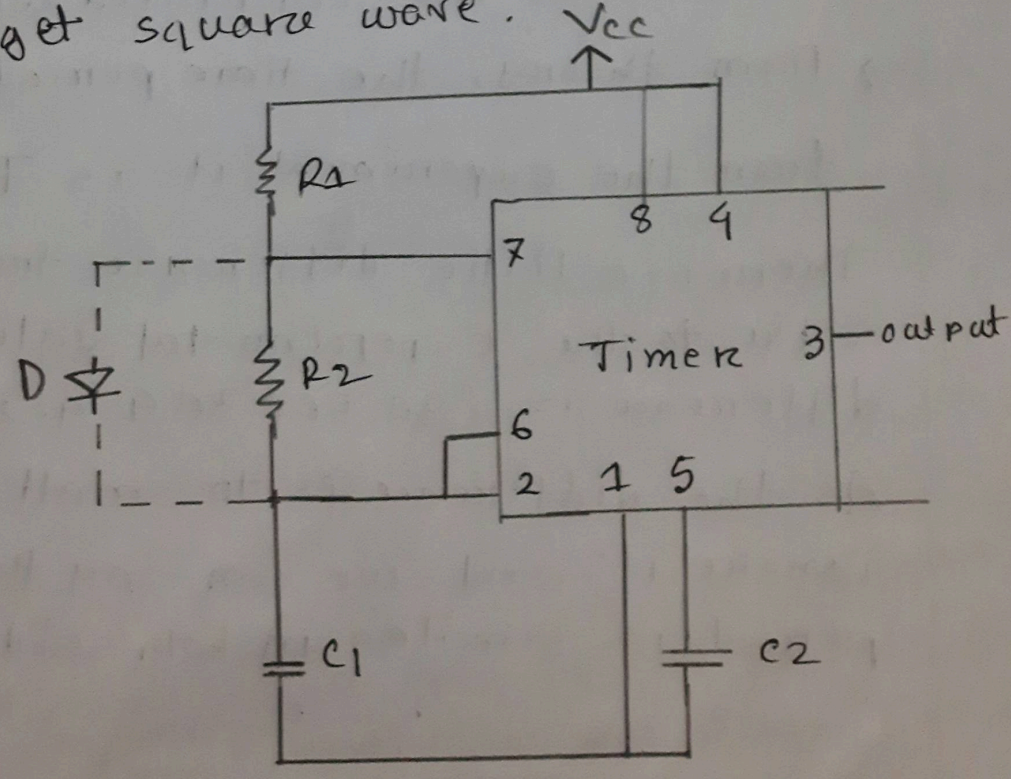
4. Can it be possible to use the above multivibrator to create variable frequency square wave generator? Justify your answer.

→ Yes, it is possible to use the above multivibrator to create variable frequency square wave generator. We can achieve our goal by using a diode with the multivibrator. Because of diode, the current will flow in one direction and it will not let the capacitor to be discharged. So, the capacitor will be charged and we will get square wave.



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5. How can we change the duty cycle of the circuit?

→ By changing the resistor value of R_2 and R_3, we or from R_1 or R_4, we can change the duty cycle.

dyty cycle = % of time in a period when the output is high.

For the experiment,

$t_1 = t_2$, $T = t_1 + t_2$. So, duty cycle $= \frac{t_1}{T} \times 100\%$

$= \frac{15.2421}{30.48242} \times 100$

$= 50\%$

Let's change the duty cycle.

$R_1 = R_4 = 1K$, $R_3 = 2$ K. $R_2 = 4.7K$

For A, $t_1 = 6.25$ms

$T = 18.50$

dyty cycle $= \frac{6.25}{18.50} \times 100\%$

$= 33.783\%$.

For B:

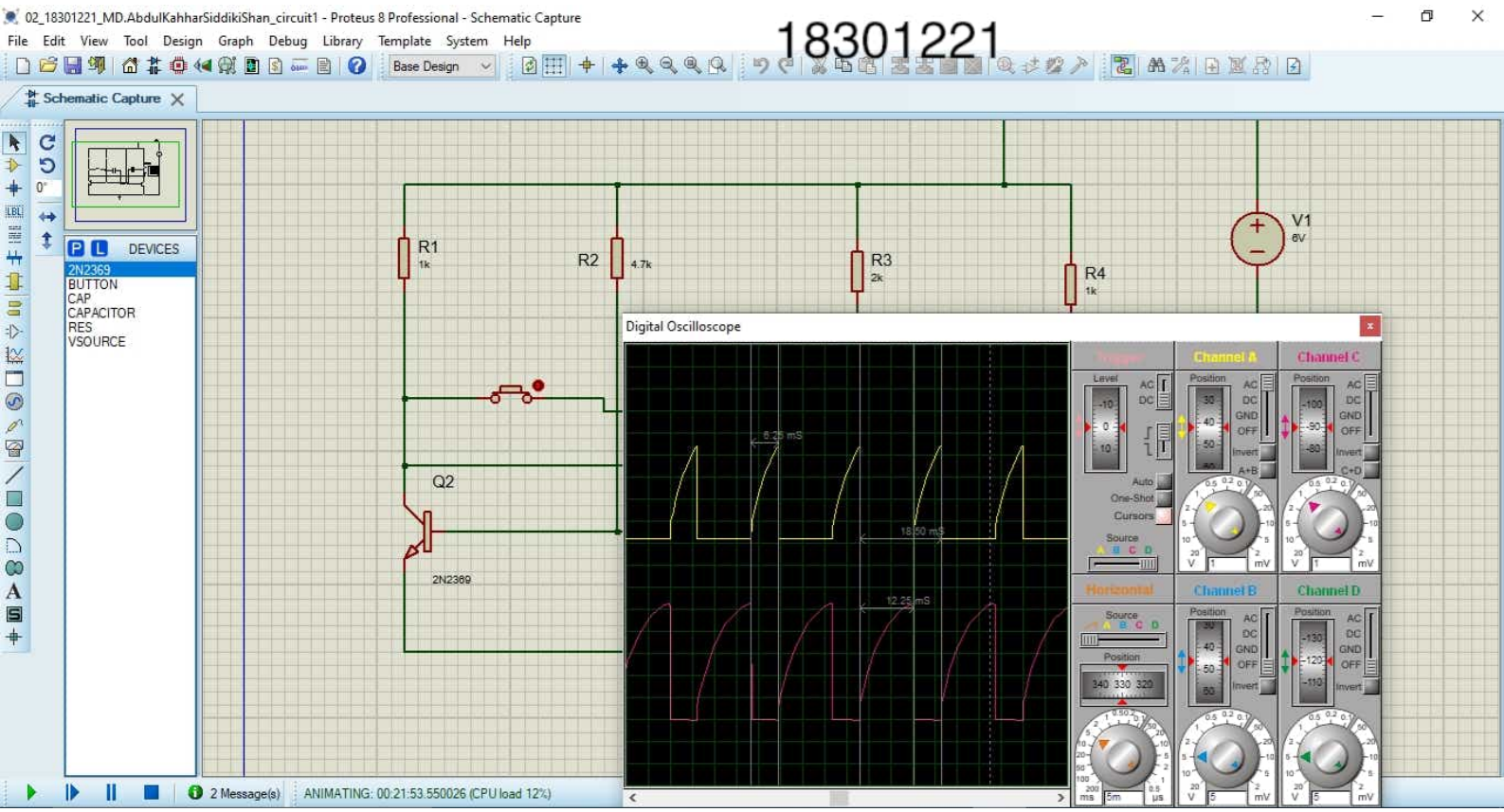
$t_{high} = 12.25$ms

$T = 18.50$

duty cycle $= \frac{t_{high}}{T} \times 100$

$= \frac{12.25}{18.50} \times 100\%$

$= 66.216\%$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18301221
File Edit View Tool Design Graph Debug Library Template System Help
Base Design
Schematic Capture
DEVICES
2N2369
BUTTON
CAP
CAPACITOR
RES
VSOURCE
R1
1k
R2
4.7k
R3
2k
R4
1k
V1
6V
Q2
2N2369
Digital Oscilloscope
Channel A
Channel B
Channel C
Channel D
Horizontal
8.25 mS
18.50 mS
12.25 mS
2 Message(s)
ANIMATING: 00:21:53.550026 (CPU load 12%)