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Date: 08-11-2021

<u>**EXPERIMENT NO: 11**</u>
<u>**Design and analysis of Emergency Lamp**</u>

<u>**Aim:**</u> To design an emergency lamp in LTSpice with the following specifications: Input: 230V 50Hz ac supply Battery: 4.8V (four 1.2 V batteries connected in series) 2 LEDs (in series): NSCW100 with 5 V breakdown voltage.
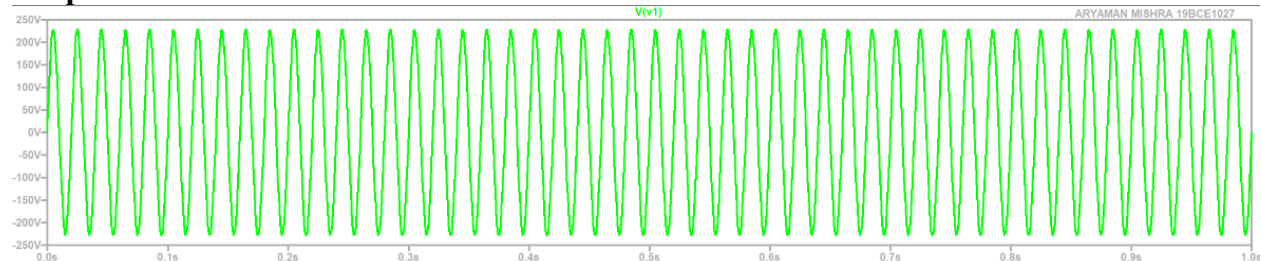
<u>**Software used:**</u> LTSpice

<u>**Components required:**</u> Resistors, voltage source, NMOS, PMOS, inductor and capacitor.

<u>**Task 1:**</u> Design the input Supply unit with switch control.

<u>**Circuit:**</u>
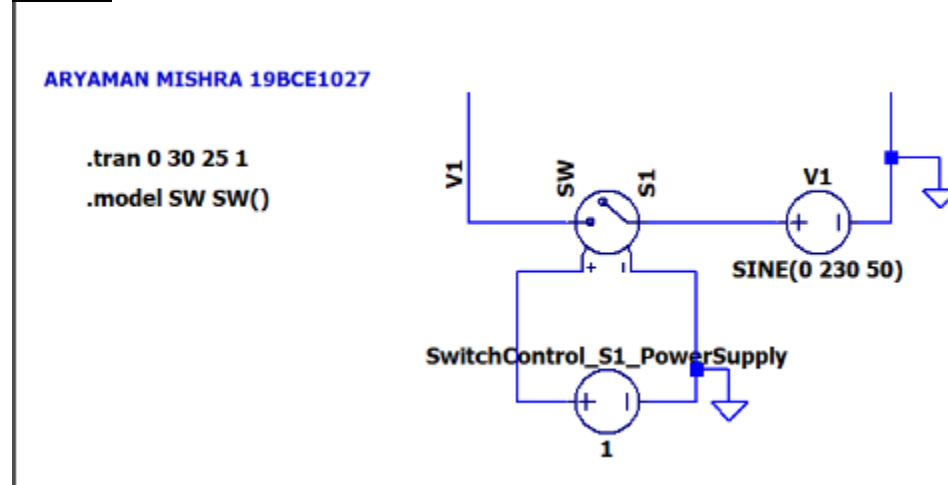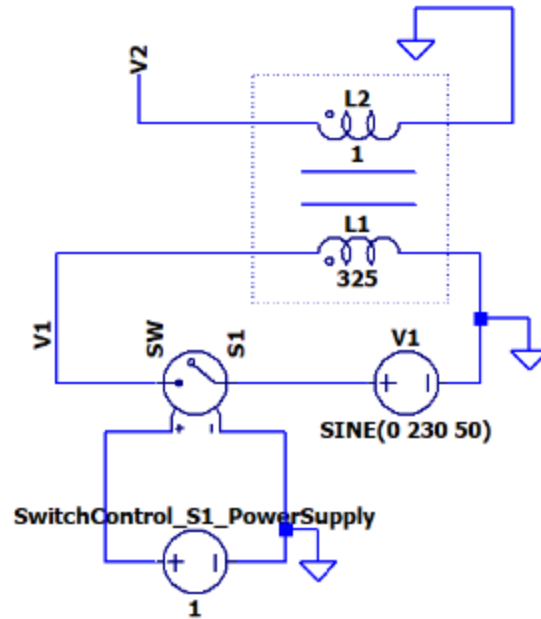

<u>**Output:**</u>

Result: Thus we have plotted voltage V1 using switch control S1.

<u>**Task 2:**</u> Design the step down transformer for reduced V2 voltage.
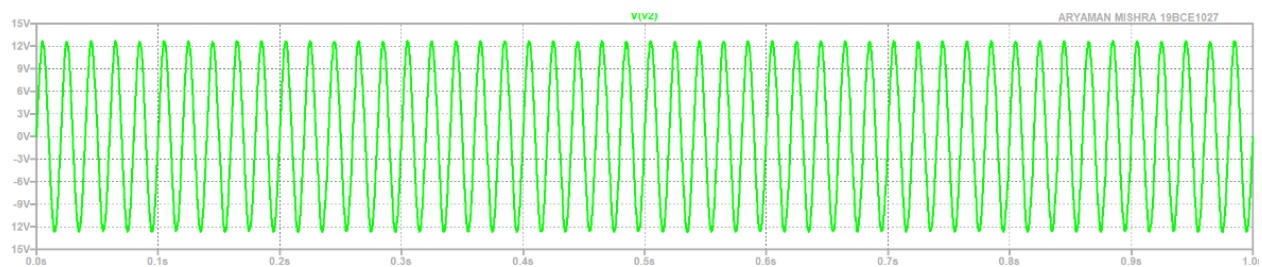
<u>**Circuit:**</u>

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.tran 0 10 9 1
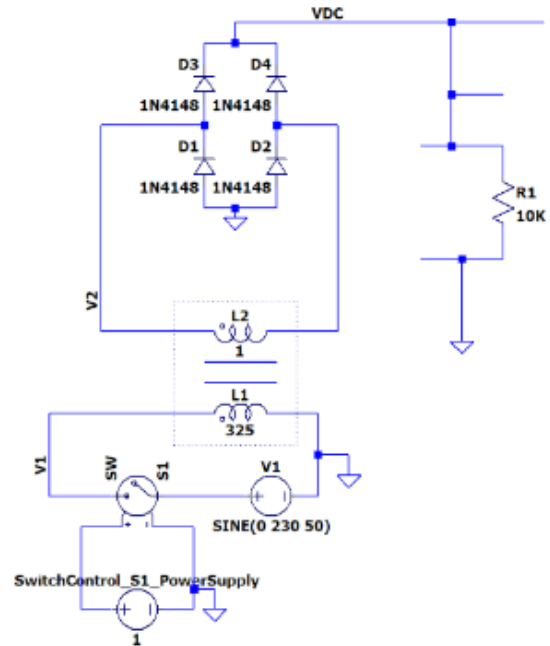
.model SW SW()

K L1 L2 1

Output:

Result: From the graph we can observe that the voltage is reduced from 230v to 13v using step down transformer

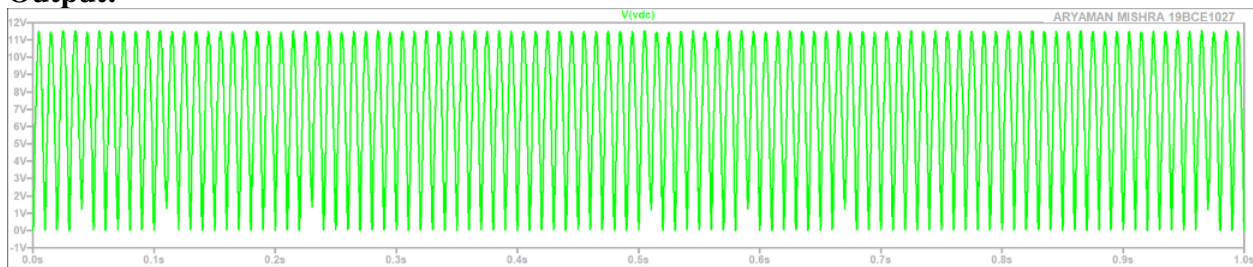**Task 3:** Design of Bridge rectifier circuit (without Capacitor).

Circuit:

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.tran 0 10 9 1
.model SW SW()
K L1 L2 1

VDC

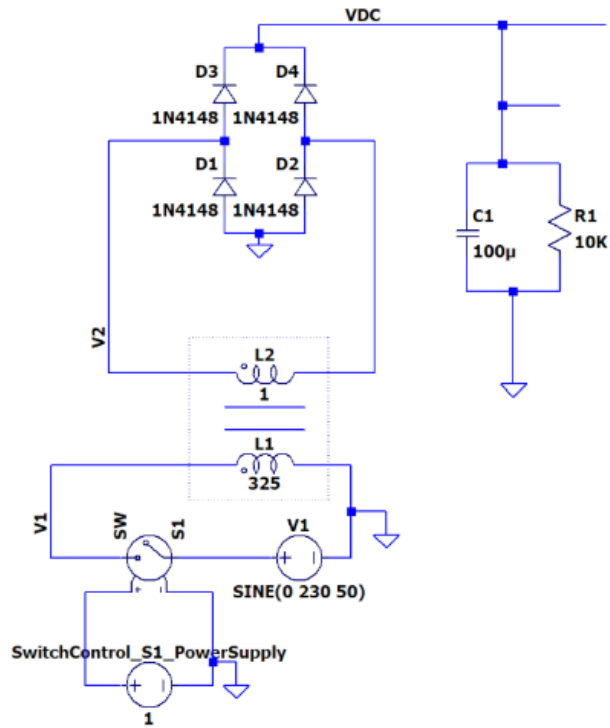D3   D4
1N4148 1N4148
D1   D2
1N4148 1N4148

R1
10K

L2
1

L1
325

V1   SW   S1   V1

SINE(0 230 50)

SwitchControl_S1_PowerSupply
1

Output:

Result: Thus we plotted the voltage VDC without using capacitor.

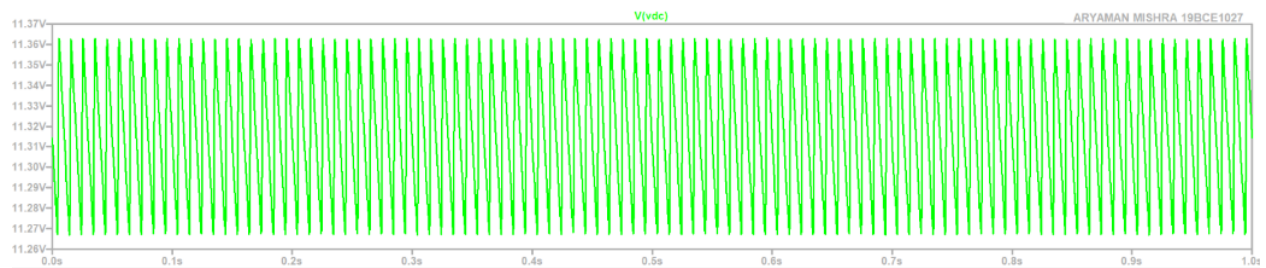**Task 4:** Design of Bridge rectifier circuit (with Capacitor).

Circuit:

VDC

D3   D4

1N4148 1N4148

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D1   D2

1N4148 1N4148

.tran 0 10 9 1

.model SW SW()

K L1 L2 1

C1   R1
100µ   10K

V2

L2
1

L1
325

V1   SW   S1   V1

SINE(0 230 50)

SwitchControl_S1_PowerSupply

1

Output:

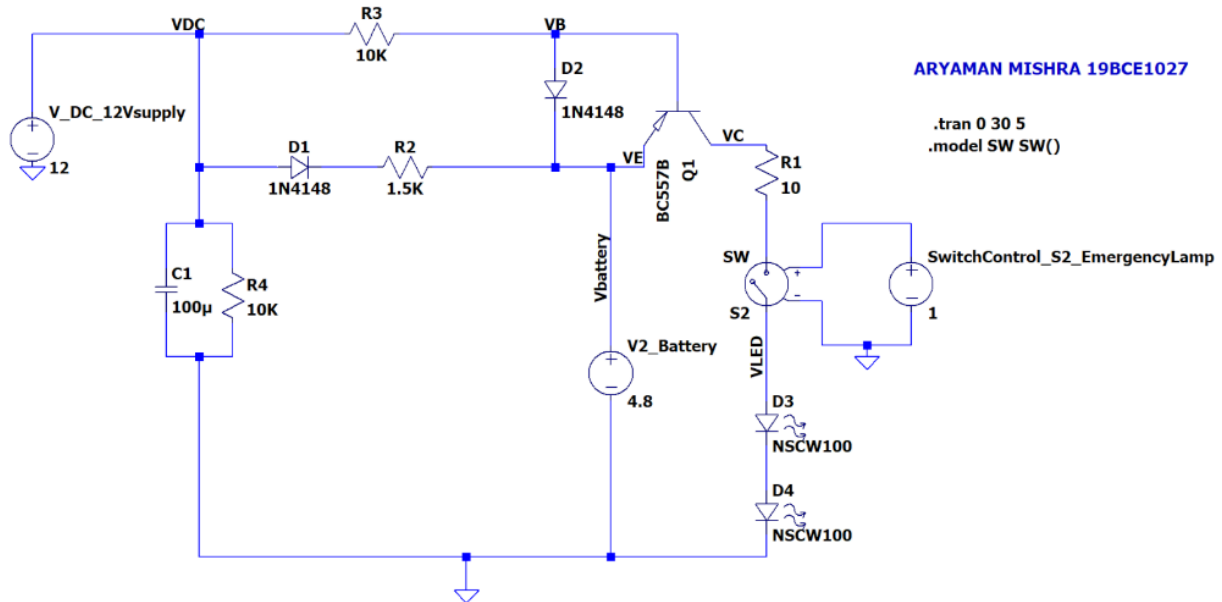V(vdc)   ARYAMAN MISHRA 19BCE1027

Result: Thus we have plotted the voltage VDC using capacitor of 100uf.
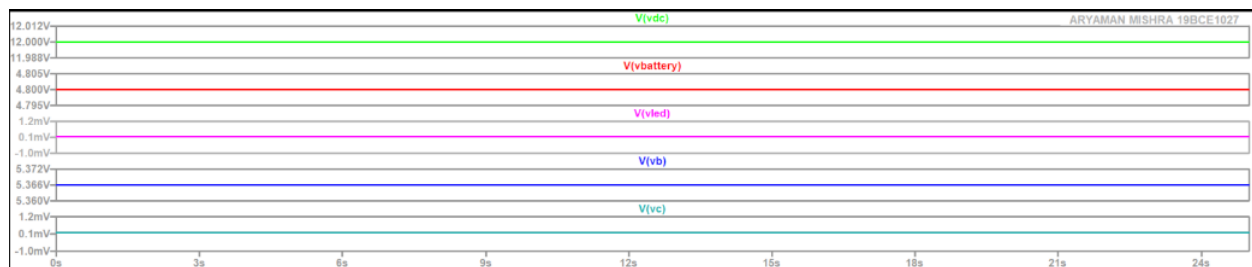
Task 5: Design of Charging circuit from 12V DC input supply.
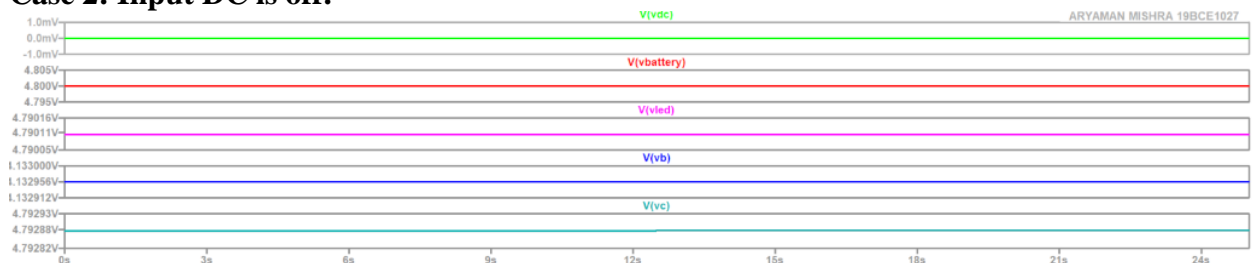
Circuit:

Output:
Case 1: Input DC is on:

Case 2: Input DC is off:

**Result:** From the plots we can observe that when the DC voltage is 12v which is given as a input supply VDC=12v and Ve=Vbattery is 4.8v Vled=Vc=0.1mv so LED is almost in off state.

When the input supply is 0V VDC is 0 so the diodes are reverse biased and Vbattery value is given to Vc results it into turning ON the LED.
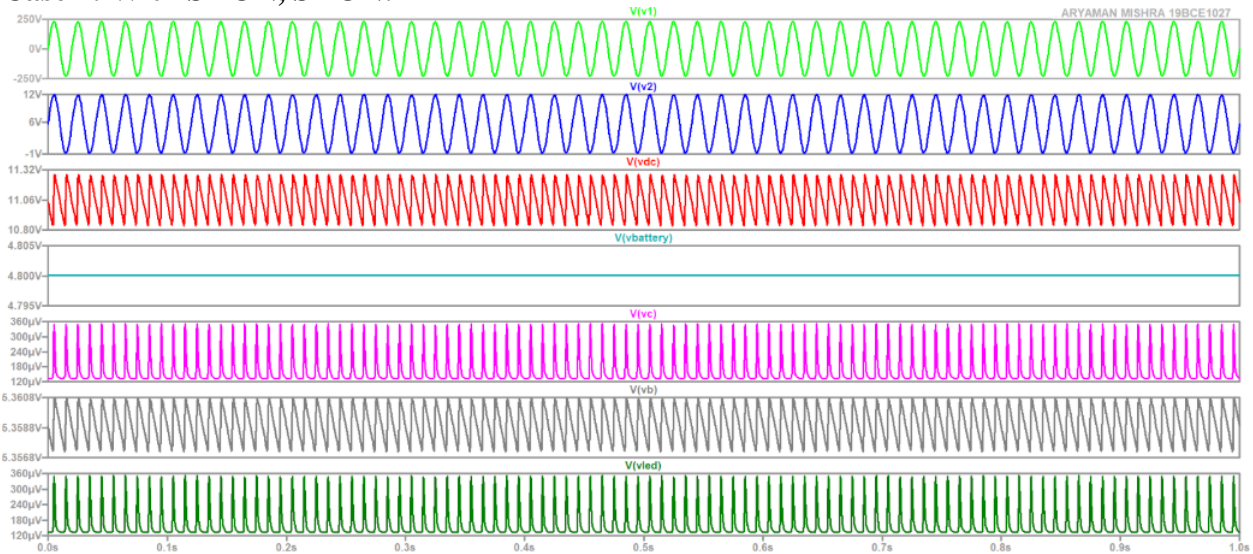
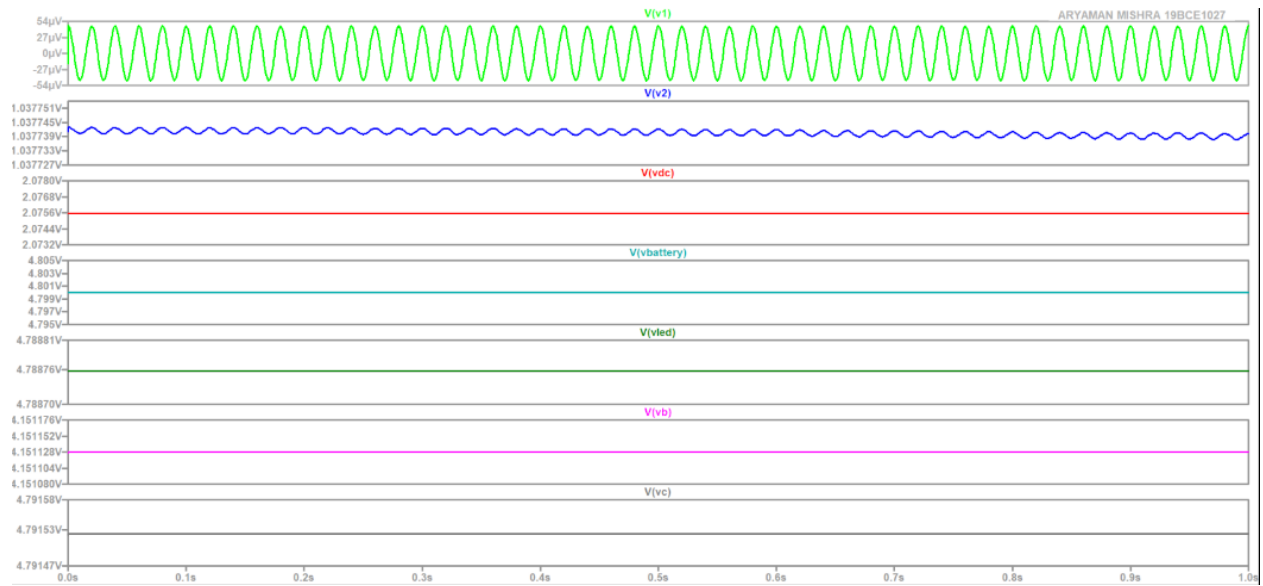**Task 6:** Integrate Bridge circuit to Emergency Lamp: Complete the circuit

Circuit:

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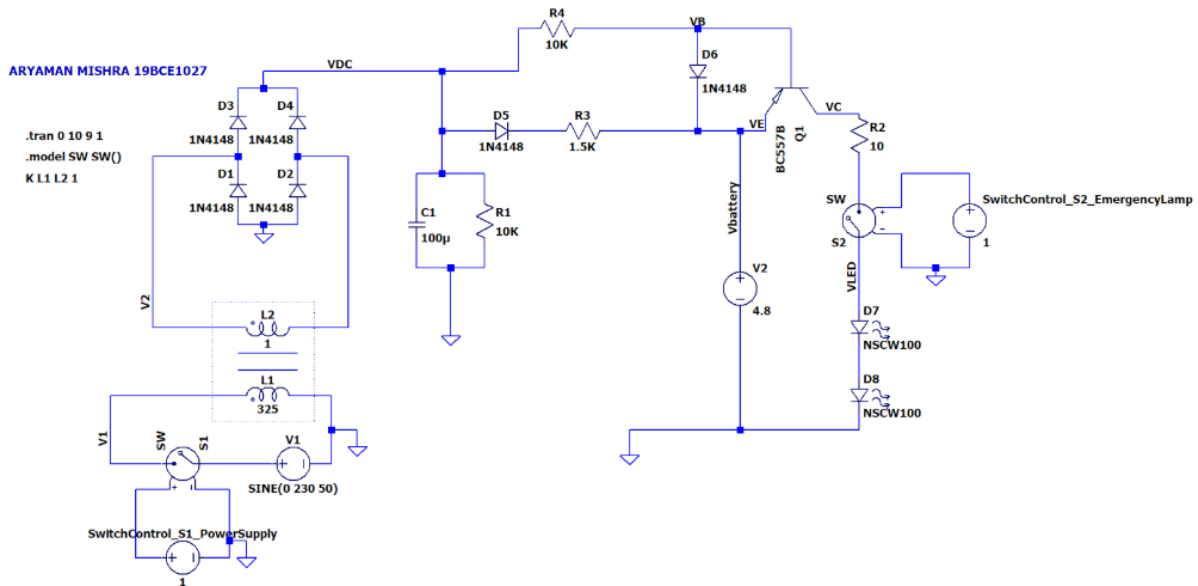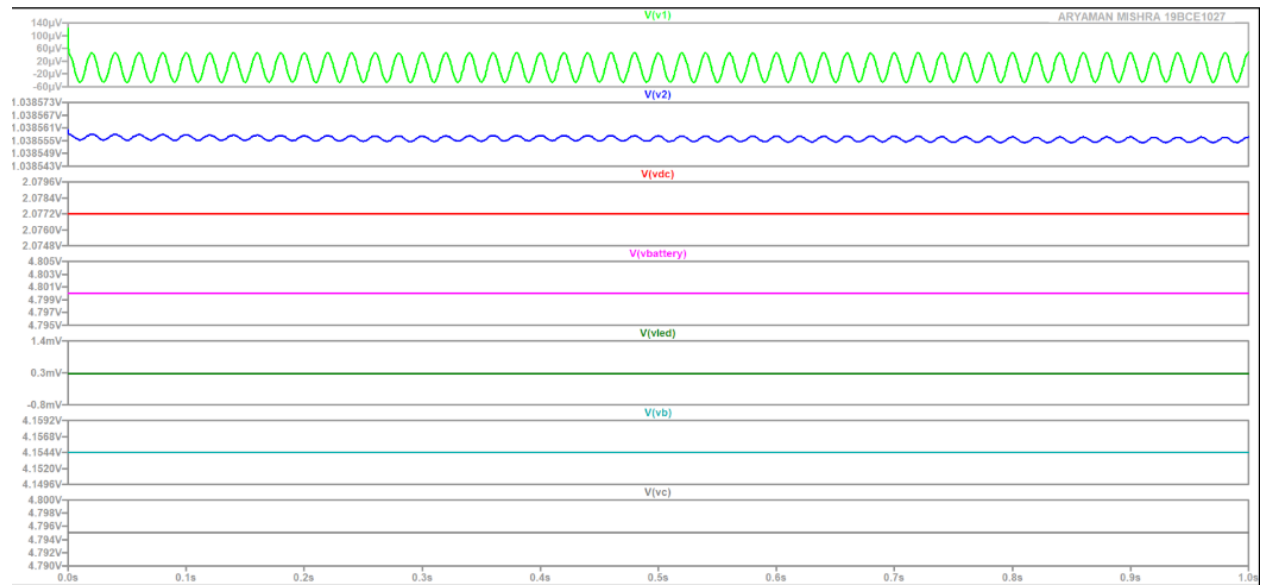
Output:
Case 1: With S1 ON, S2 ON:

Result: Thus we have plotted the graph of where both S1 and S2 are on, we can observe that Vc and VLED are equal.

Case 2: With S1 OFF, S2 ON:

Result: Thus we have plotted the graph when the S1 is off and S2 is in on condition, here also we can observe that Vc and VLED are equal

Case 3: With S1 OFF, S2 OFF:

Result: Thus we have plotted the graph when the both switches are in off, here Vc and VLED are not equal