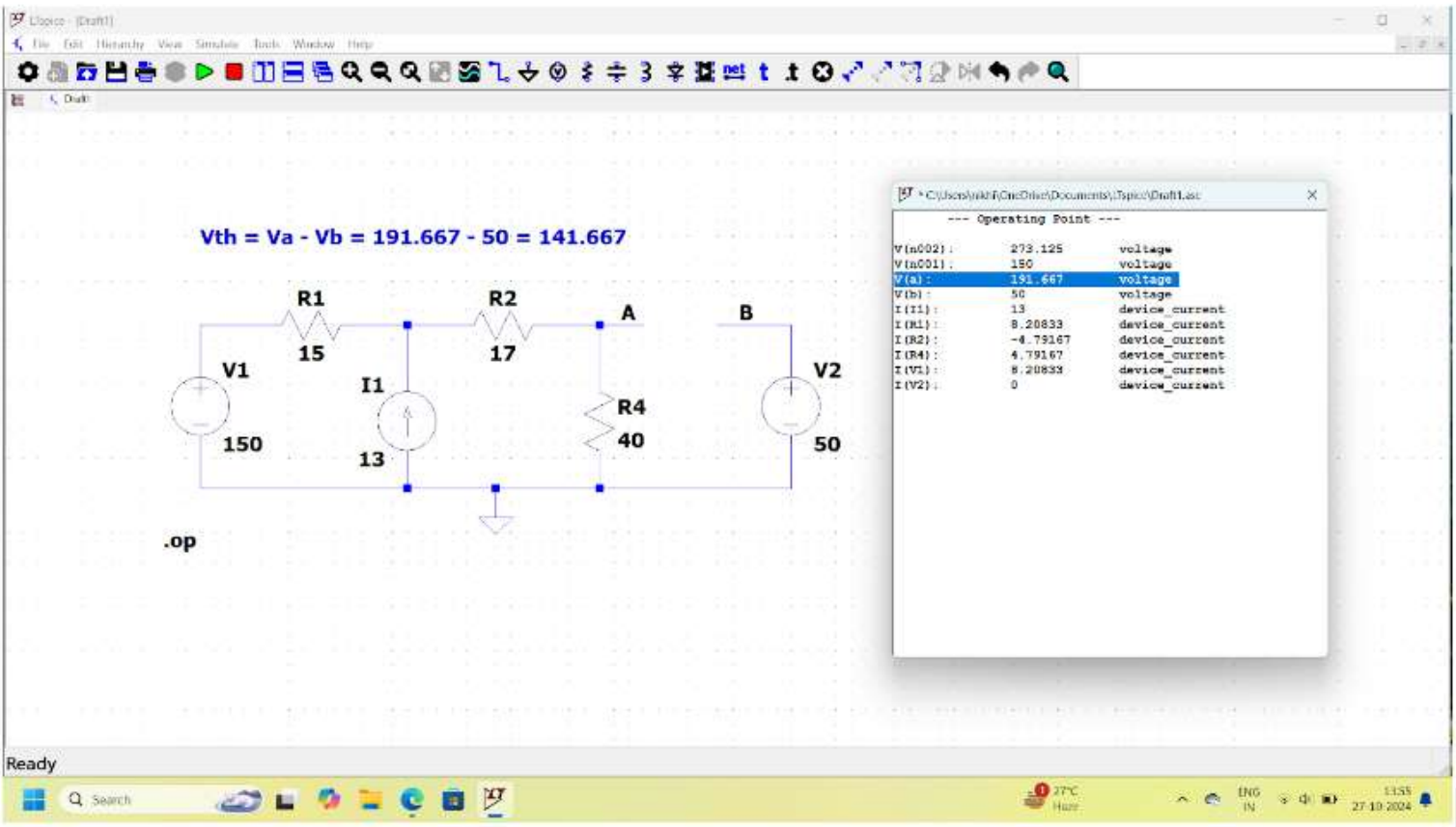
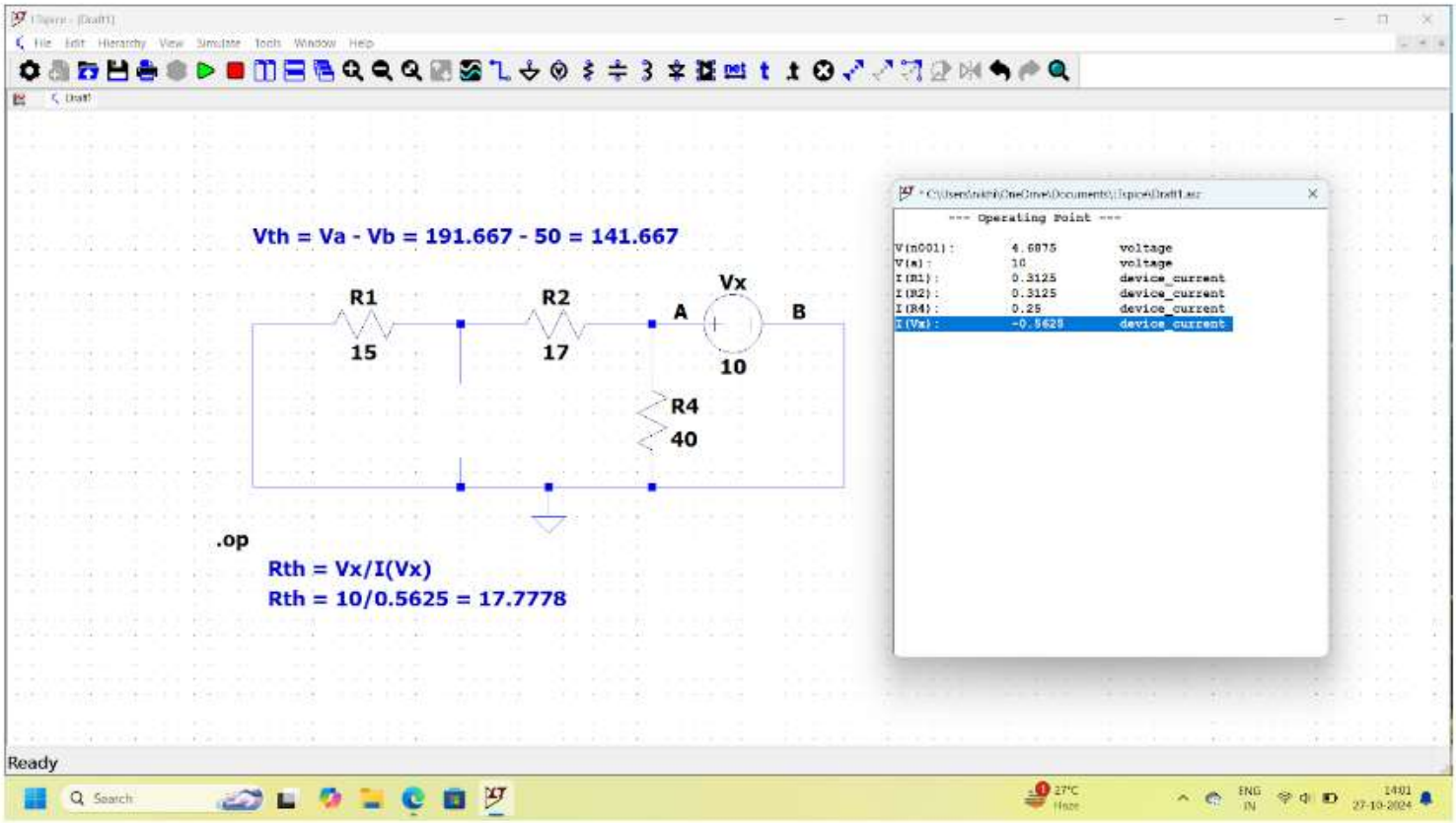
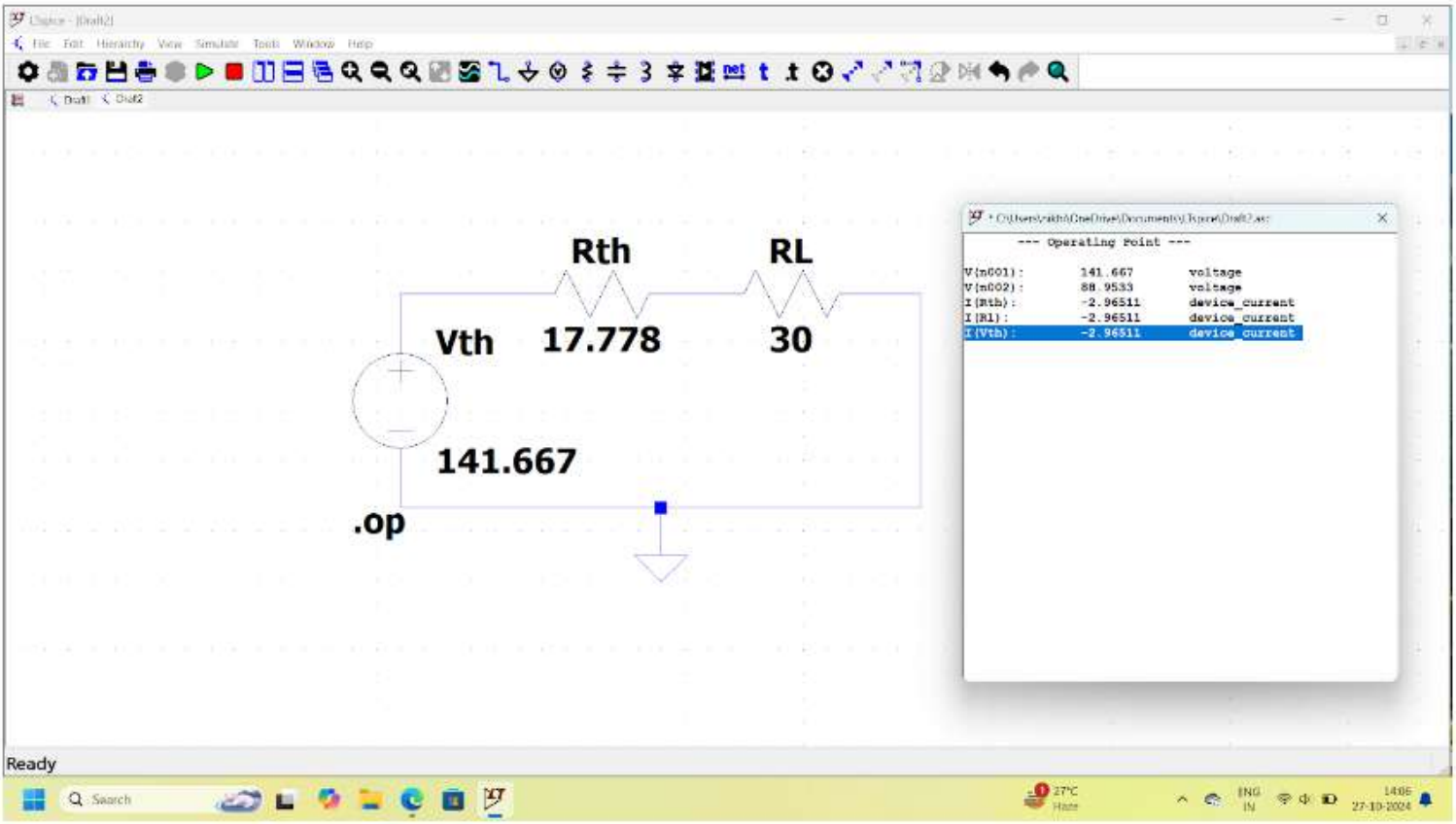
Vth:


Vth = Va - Vb = 191.667 - 50 = 141.667
R1
15
R2
17
A
B
V1
150
I1
13
R4
40
V2
50
.op
--- Operating Point ---
V(n002): 273.125 voltage
V(n001): 150 voltage
V(a): 191.667 voltage
V(b): 50 voltage
I(I1): 13 device_current
I(R1): 8.20833 device_current
I(R2): -4.79167 device_current
I(R4): 4.79167 device_current
I(V1): 8.20833 device_current
I(V2): 0 device_current
Ready

Rth:


Vth = Va - Vb = 191.667 - 50 = 141.667
R1
15
R2
17
A
Vx
10
B
R4
40
.op
Rth = Vx/I(Vx)
Rth = 10/0.5625 = 17.7778
--- Operating Point ---
V(n001): 4.6875 voltage
V(a): 10 voltage
I(R1): 0.3125 device_current
I(R2): 0.3125 device_current
I(R4): 0.25 device_current
I(Vx): -0.5625 device_current
Ready

IL:


Rth
RL
Vth
17.778
30
141.667
.op
--- Operating Point ---
V(n001): 141.667 voltage
V(n002): 88.9533 voltage
I(Rth): -2.96511 device_current
I(Rl): -2.96511 device_current
I(Vth): -2.96511 device_current
Ready

SOMAIYA VIDYAVIHAR UNIVERSITY

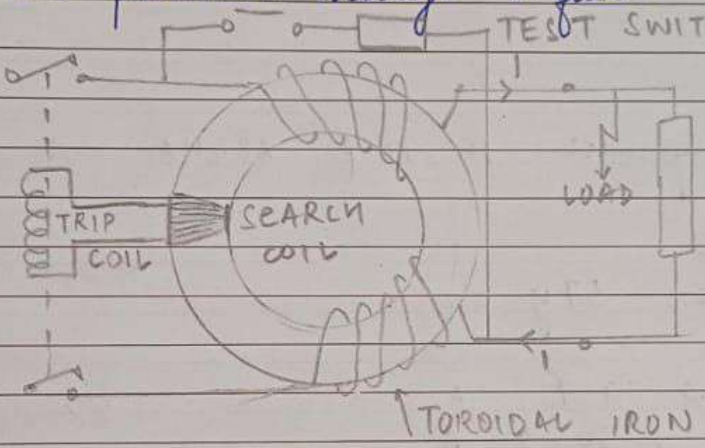
Batch: C2-2 Roll No.: 16010124107
Name: Ashwera Hasan
Course:
Experiment / assignment / tutorial No. C4 IA1
Grade: Signature of the Faculty with date

Q3) A switch fuse unit is an electrical device that combines a switch and fuse in a single housing, allowing us to isolate electrical circuits.

→ It protects circuits from overloads and short circuits by using a fuse.

→ Reduces risk of electrical fires and equipment damage.

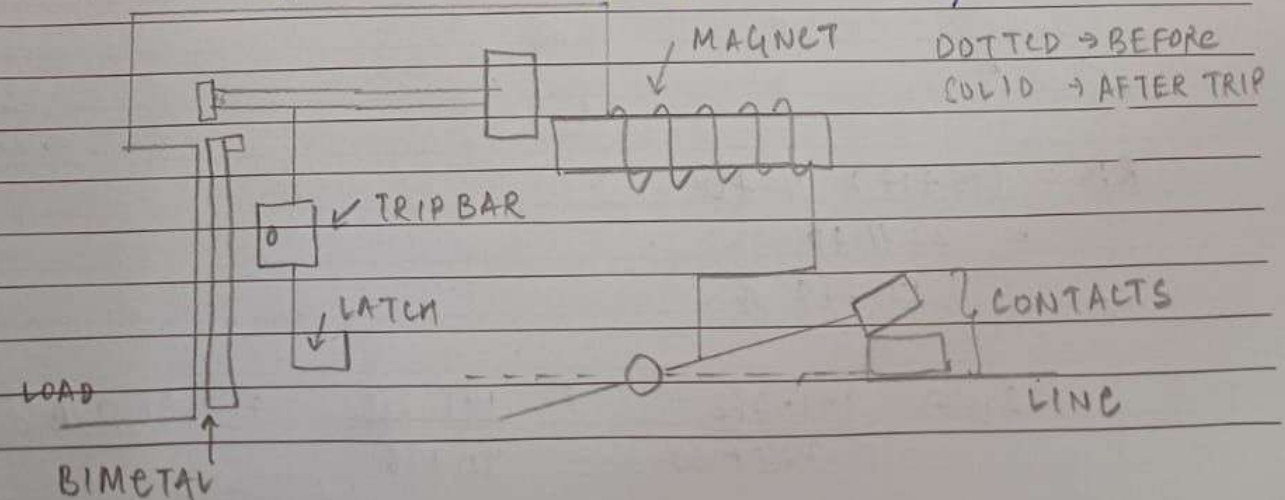
→ Allows manual disconnection of power while offering overcurrent protection through a fuse.



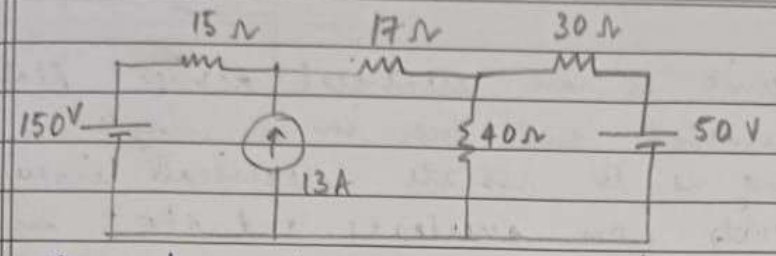
A miniature circuit breaker (MCB) is an electromechanical device that automatically switches off circuits to prevent overload. It operates by detecting excess current and tripping a switch to break the circuit.

→ It can be easily reset after tripping, unlike fuses that need replacement.

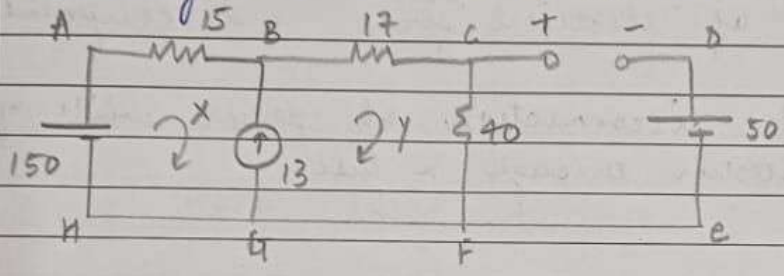
→ It prevents fires and damage by disconnecting circuits.



Q1)



Removing the 30 Ω load resistor.



Applying supermesh to loops ABGHA and BCFGB.

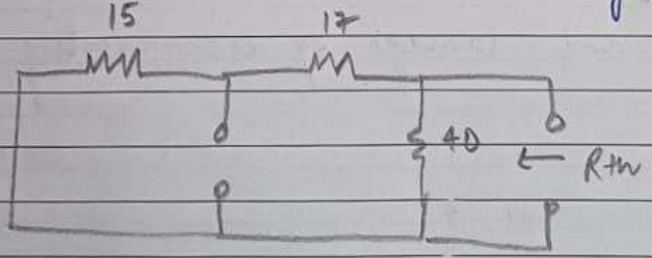
$$y - x = 13$$
$$150 - 15x - 57y = 0$$

$$y = 4.7917 \text{ A}$$
$$x = -8.2083 \text{ A}$$

Applying V_{th} in loop CDEFC.

$$-50 + 40y - V_{th} = 0$$
$$V_{th} = -141.668 \quad (\text{D is +ve wrt C})$$

For R_{th}, short circuit all voltage and current sources.



$$R_{th} = (15+17) \,//\, 40$$
$$= 32 \,//\, 40$$
$$= 17.778 \ \Omega$$

$$I_L = \frac{141.668}{17.778 + 30} = \frac{141.668}{47.778} = 2.9651 \text{ A}$$