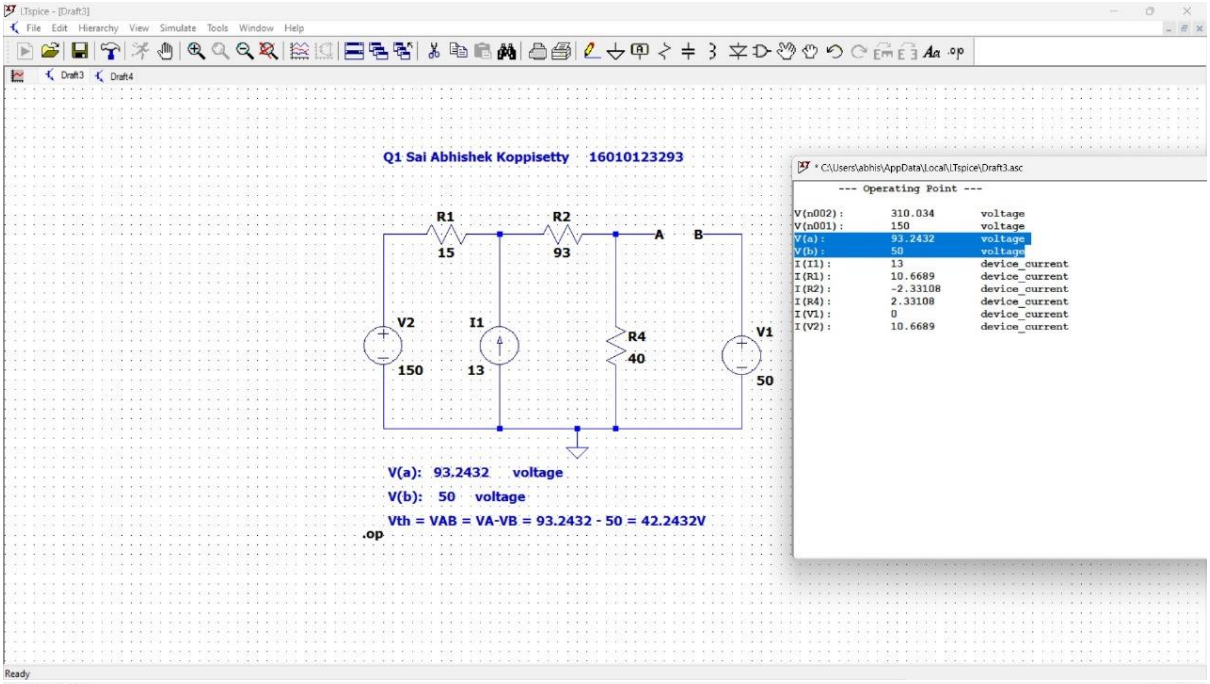
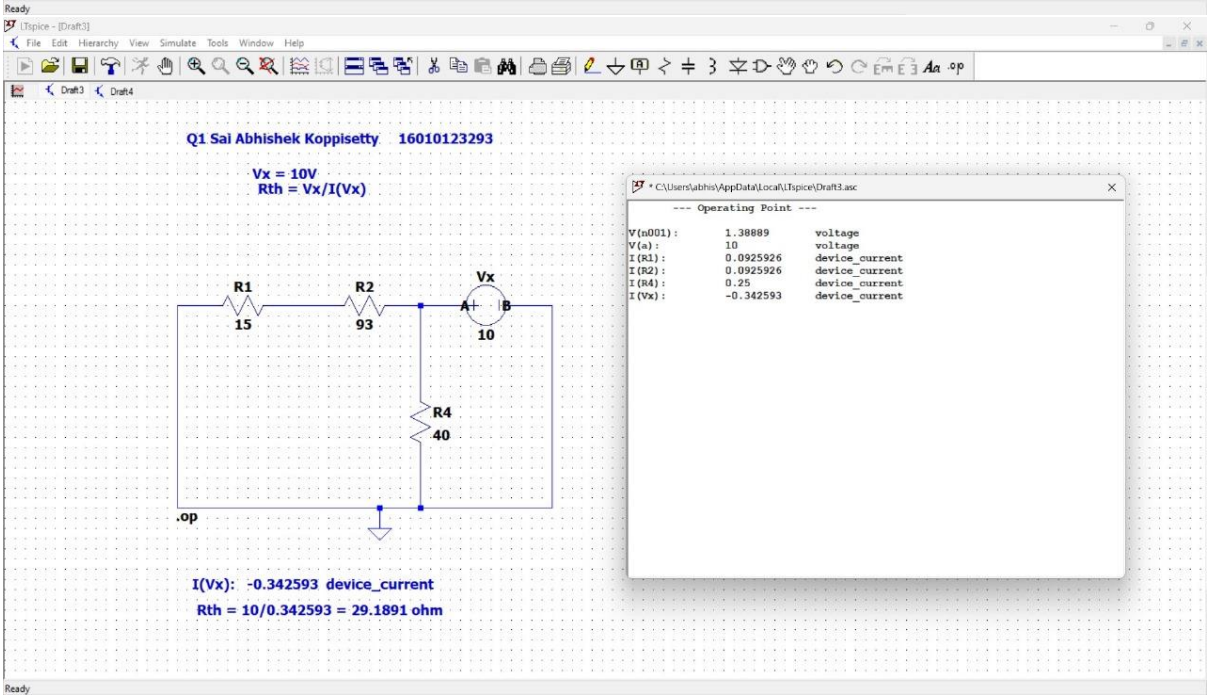
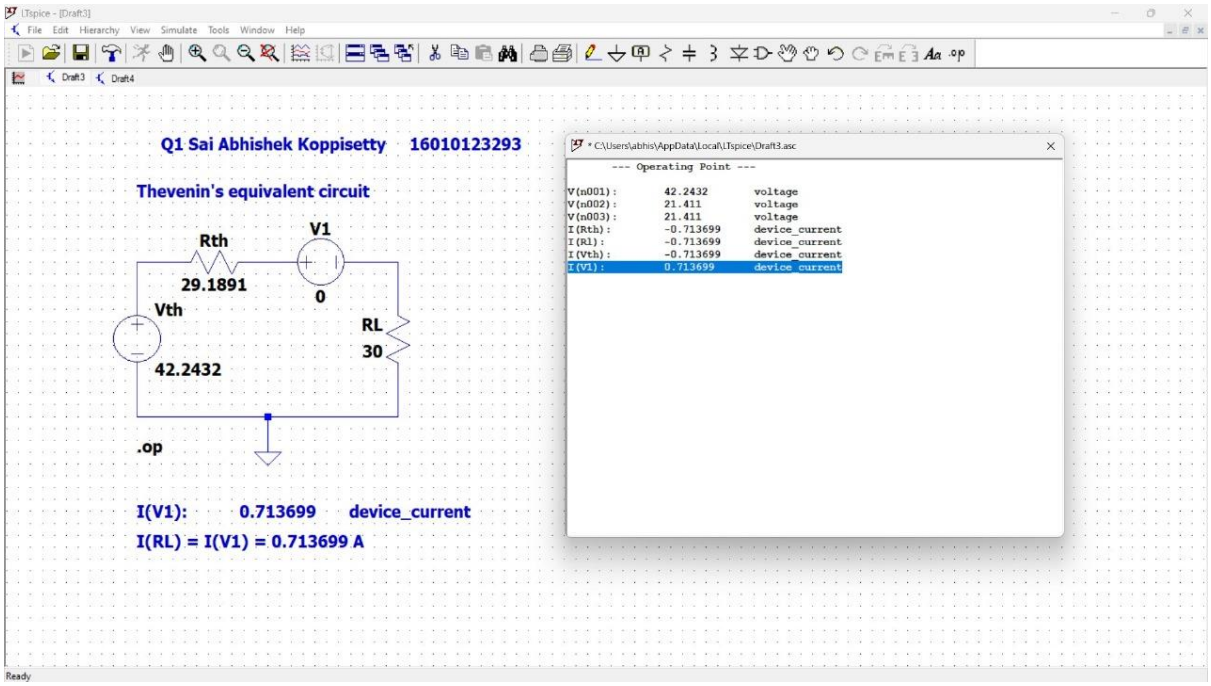

Q1 Sai Abhishek Koppisetty 16010123293
R1
15
R2
93
A
B
V2
150
I1
13
R4
40
V1
50
V(a): 93.2432 voltage
V(b): 50 voltage
Vth = VAB = VA-VB = 93.2432 - 50 = 42.2432V
.op
* C:\Users\abhis\AppData\Local\LTspice\Draft3.asc
--- Operating Point ---
V(n002): 310.034 voltage
V(n001): 150 voltage
V(a): 93.2432 voltage
V(b): 50 voltage
I(I1): 13 device_current
I(R1): 10.6689 device_current
I(R2): -2.33108 device_current
I(R4): 2.33108 device_current
I(V1): 0 device_current
I(V2): 10.6689 device_current


Q1 Sai Abhishek Koppisetty 16010123293
Vx = 10V
Rth = Vx/I(Vx)
R1
15
R2
93
Vx
A
B
10
R4
40
.op
I(Vx): -0.342593 device_current
Rth = 10/0.342593 = 29.1891 ohm
* C:\Users\abhis\AppData\Local\LTspice\Draft3.asc
--- Operating Point ---
V(n001): 1.38889 voltage
V(a): 10 voltage
I(R1): 0.0925926 device_current
I(R2): 0.0925926 device_current
I(R4): 0.25 device_current
I(Vx): -0.342593 device_current



Parameter	Theoretical value	Simulated Value
Vth	43.28 V	42.2432 V
Rth	29.2397 ohm	29.1891 ohm
Load current IL	0.7305 A	0.713699 A

Theoretical values calculations:

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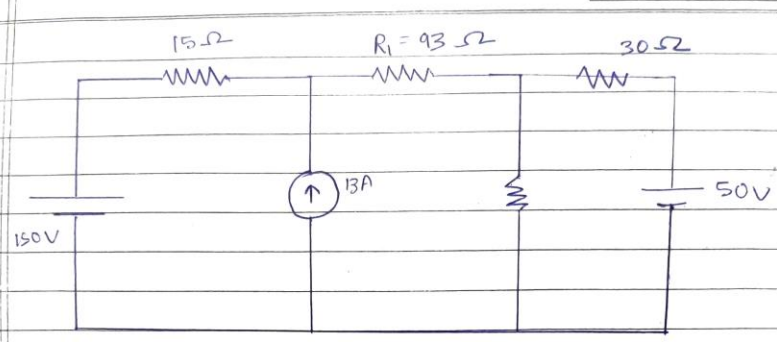
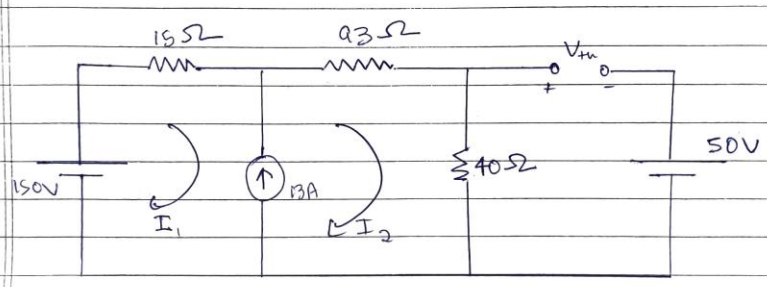
Experiment / assignment / tutorial No. IA-1
Grade: Signature of the Faculty with date

Q1



Ans -



applying super-mesh analysis.

$I_2 - I_1 = 13 \rightarrow (1)$

apply KVL to outer loop of super-mesh.

$150 - 15I_1 - 93I_2 - 40I_2 = 0$

$150 = 15I_1 + 133I_2$

substituting (1) in (2), we get

$15I_1 + 133(13 + I_2) = 150$

$15I_1 + 133I_1 + 1729 = 150$

$148I_1 = -1579$

$I_1 = \frac{-1579}{148} = -10.668$ A

$\therefore I_1 = -10.668$ A

$I_2 = 13 + I_1 = 13 + (-10.668)$

$\therefore I_2 = 2.332 \text{ A}$

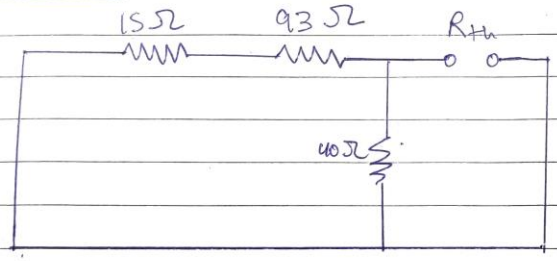
For V_{th}:

$40I_2 - V_{th} - 50 = 0$

$V_{th} = 40(2.332) - 50.$

$= 43.28 \text{ V}$

For R_{th}:



$R' = 15 + 93 = 108 \ \Omega$

$\frac{1}{R''} = \frac{1}{108} + \frac{1}{40}$

$= 0.0092 + 0.025$

$\frac{1}{R''} = 0.0342$

$\therefore R'' = 29.2397 \ \Omega = R_{th}$

Now,

$I_{30\Omega} = \frac{V_{th}}{R_L + R''} = \frac{43.28}{30 + 29.2397} = \frac{43.28}{59.2397} = 0.7305 \text{ A}$

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Grade: Signature of the Faculty with date

Q7 Compare incandescent light bulb, compact fluorescent lamp (CFL) and LED (write any 8 points of difference.

Ans- Here are 8 ~~differences~~ points of comparison between incandescent light bulbs, compact fluorescent lamps (CFLs), and light-emitting diodes (LEDs):

1. Energy Efficiency:

- Incandescent: least energy-efficient, as it produces more heat than light.
- CFL: More energy-efficient than incandescent bulbs, but less so compared to LEDs.
- LED: Highly energy-efficient, ~~than incandescent bulbs~~, converting a larger percentage of energy into light rather than heat.

2. Life span:

- Incandescent: Shortest lifespan, typically around 1000 hours.
- CFL: Longer lifespan than incandescent bulbs, ranging from 8000 to 10000 hours.
- LED: Longest lifespan, with some models capable of lasting up to 25,000 hours or more.

3 Light quality:

- Incandescent: Provides warm and soft light with good ~~colouring~~ rendering.
- CFL: Initially had issues with colour temperature, but newer models offer a range of options.

- LED : Offers a wide range of colour temperatures and good colour rendering, comparable to incandescent bulbs.

4 Start-up time :

- Incandescent : Instantaneous, reaches full brightness immediately.
- CFL : Generally has a short delay before reaching full brightness.
- LED : Instantaneous start-up, reaching full brightness instantly.

5. Heat Emission :

- Incandescent : Generates a significant amount of heat, contributing to energy waste.
- CFL : Generates less heat compared to incandescent bulbs.
- LED : Produces very little heat, making it the most energy-efficient option.

6. Environmental Impact :

- Incandescent : Contains no hazardous materials, but is less energy-efficient.
- CFL : Contains a small amount of mercury, requiring proper disposal to minimise environmental impact.

- LED: Contains no hazardous materials and is recyclable making it more environmentally friendly.

7. Dimmability:

- Incandescent: Naturally dimmable without the need for special fixtures.
- CFL: Dimmable options are available but may require compatible dimmer switches.
- LED: Many LED bulbs are dimmable, but compatibility with dimmer switches should be checked.

8. Cost:

- Incandescent: Generally the least expensive upfront, but higher operating costs over time.
- CFL: Moderately priced, with lower operating costs than incandescent bulbs.
- LED: Initially more expensive, but the cost has decreased, and the energy saving over time make it a cost-effective choice.