ECE-249
CA-2

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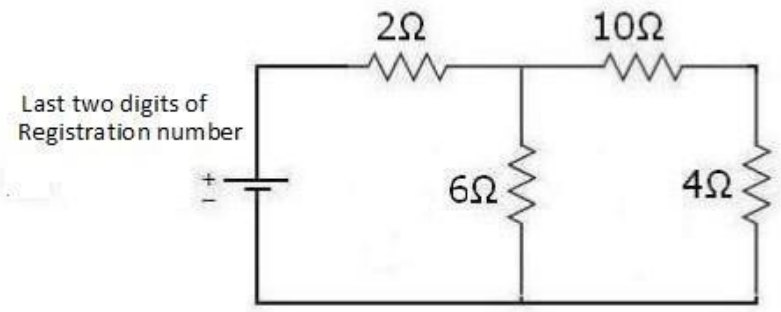
Registration No - 12315581

Section - K23PG

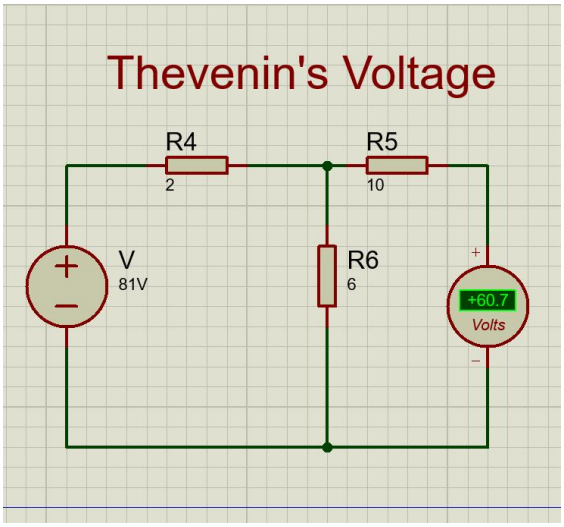
Roll No - 34

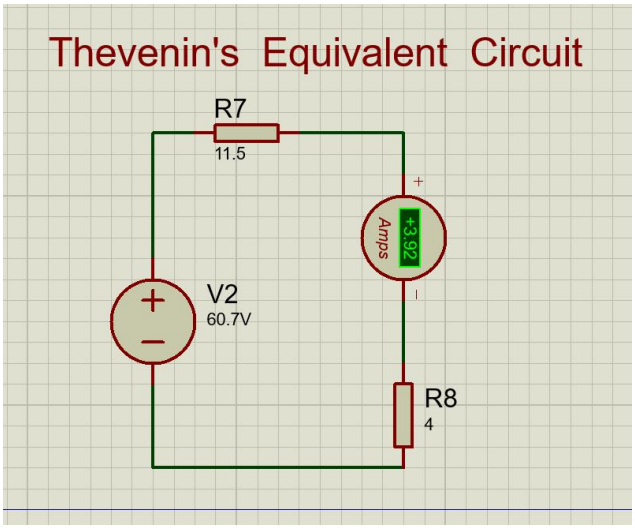
Subject - ECE-249(CA-2)

Q1. Apply the Thevenin and Norton theorem to find the value of Current across 4 Ohm, if the input applied voltage is the last two digits of your registration number.
**Verify the simulation result with theoretical result.
** (Example: If your registration is 12315216 then Input supply is 16 V and if last two digit is zero then Input supply is 10 V.



Answer 1 -

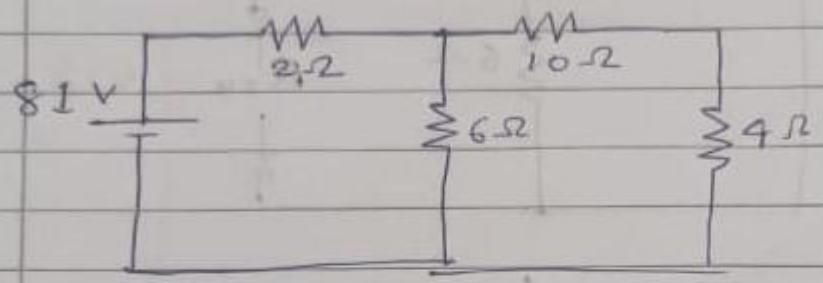




Thevenin's Theorem

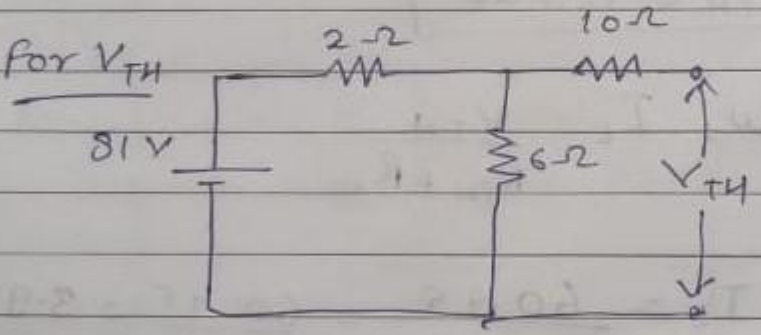
Registration no - 12315581

$\therefore V = 81\ V$



$R_L = 4\Omega$ (Given)

For V_{TH}



$$\frac{V_{TH} - 81}{2} + \frac{V_{TH}}{6} = 0$$

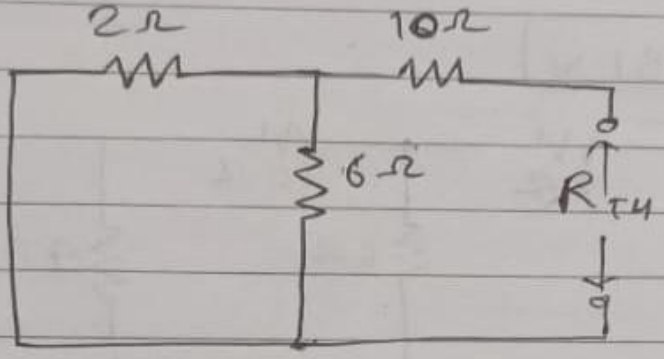
$$3(V_{TH} - 81) + V_{TH} = 0$$

$$4V_{TH} - 243 = 0$$

$$V_{TH} = \frac{243}{4} = 60.75$$

Now, For R_{TH}

Remove all voltage sources



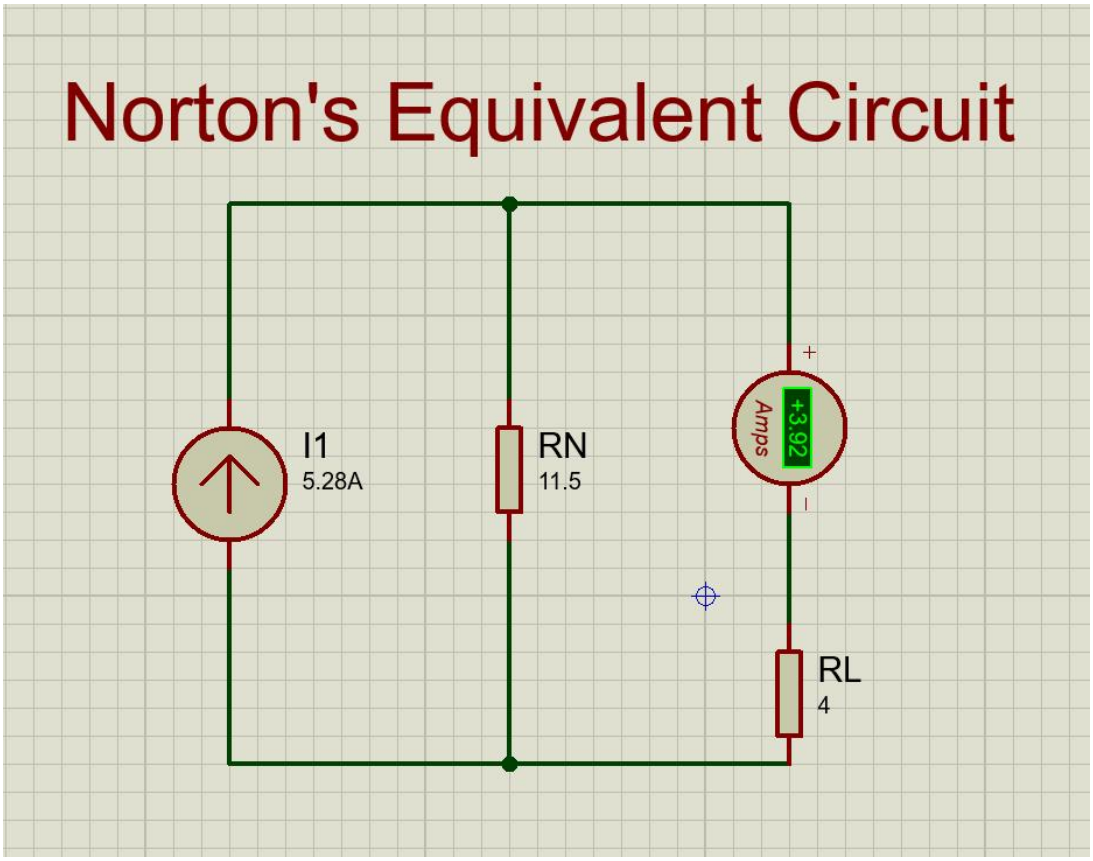
$$R_{TH} = 10 + \left(\frac{2 \times 6}{2+6}\right) = 10 + \frac{12}{8} = 10 + 1.5$$

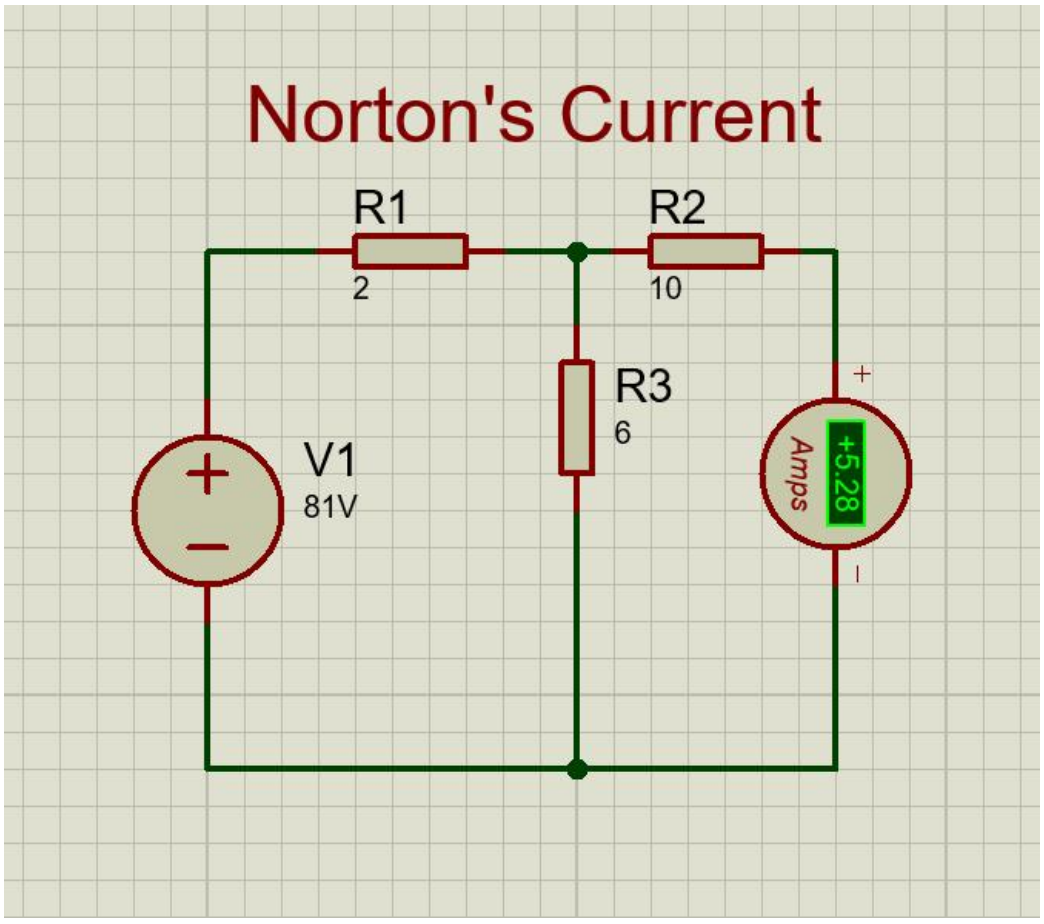
$$\boxed{R_{TH} = 11.5\ \Omega}$$

Now, $I_L = \dfrac{V_{TH}}{R_{TH} + R_L}$

$$I_L = \frac{60.75}{11.5 + 4} = \frac{60.75}{15.5} = 3.92\ A$$

$$\boxed{I_L = 3.92\ A}$$

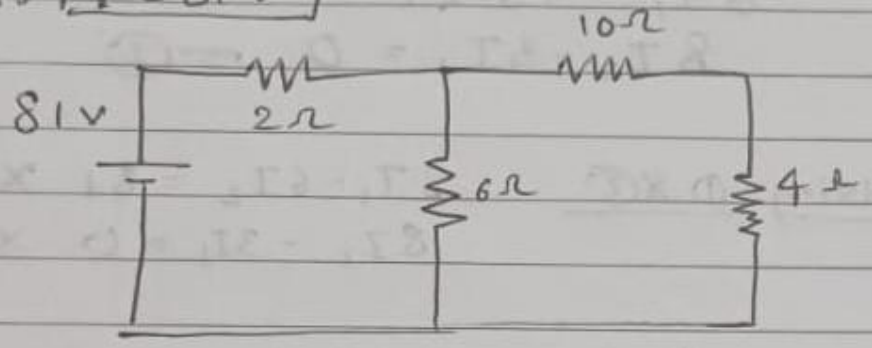

Norton's Equivalent Circuit
I1
5.28A
RN
11.5
+
Amps
+3.92
-
RL
4


Norton's Current
R1
2
R2
10
R3
6
V1
81V
+
Amps
+5.28
-

Norton's Theorem

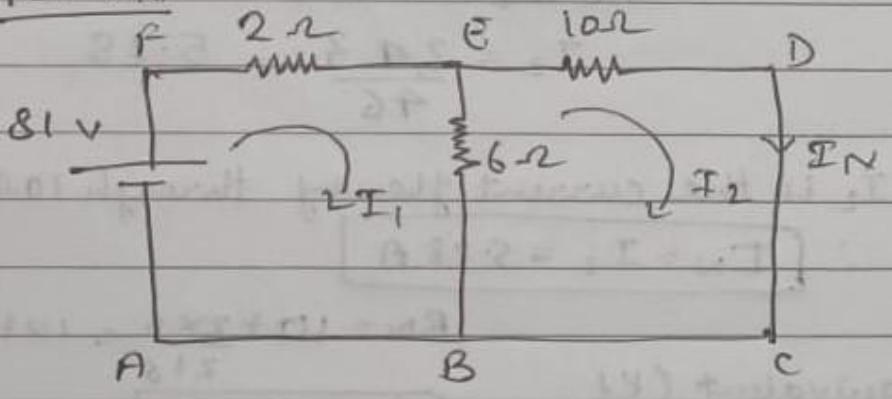
Registration no. - 12315581

$\therefore$ **V = 81 V**



R_L = ~~4Ω~~ (Given)

For I_N



Applying KVL in loop ABEF :

$$81 - 2I_1 - 6(I_1 - I_2) = 0$$
$$81 - 2I_1 - 6I_1 + 6I_2 = 0$$
$$8I_1 - 6I_2 = 81 \quad \text{—— (1)}$$

__/__/__ 4

Applying KVL in loop BCDE

$$6(I_1 - I_2) - 10I_2 = 0$$
$$6I_1 - 6I_2 - 10I_2 = 0$$
$$6I_1 = 16I_2$$
$$8I_2 - 3I_1 = 0 \quad \text{— (2)}$$

Solving (1) & (2)

$$8I_1 - 6I_2 = 81 \times 3$$
$$8I_2 - 3I_1 = 0 \times 8$$

$$24I_1 - 18I_2 = 243$$
$$-24I_1 + 64I_2 = 0$$
$$46I_2 = 243$$
$$I_2 = \frac{243}{46} = 5.28$$

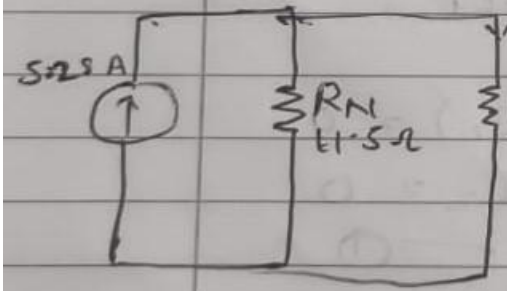
As, I_2 is the current flowing through 10Ω resistor.

$$\therefore \boxed{I_N = I_2 = 5.28\ A}$$

$$R_N = 10 + \frac{2 \times 6}{2+6} = 10 + 1.5$$

$$\boxed{R_N = 11.5\ \Omega}$$

Norton's Equivalent Ckt.



$$\therefore I_L = \frac{I_N R_N}{R_N + R_L} = \frac{5.28 \times 11.5}{11.5 + 4}$$

$$\boxed{I_L = \frac{60.75}{15.5} = 3.92\ A}$$

Q2. Implementation of a Boolean function using 4:1 multiplexer on proteus software. The Minterms will be implementation of Decimal to octal conversion of your registration number.

**For example: if your registration is (12315532)10 (assume it is in decimal) and the octal conversion of this is (56765614)8. Then you need to implement last 4 digit start from LSB. Now you need to implement 5614 according to example given. So, implement (,,) = ∑(, ,,) using 4:1 Multiplexer.

***Also implementing number does not repeat twice. For example registration is 12315534, and octal conversion will be 56765616. In this case 6 is repeating twice. So, you need to take the next MSB, like 7, 5,1, 6. Implement (,,) = ∑(,, ,) using 4:1 Multiplexer.

Answer 2 -

Registration no : 12315581

Decimal to Octal Conversion of Reg no.

8	12315581	5
8	1539447	7
8	192430	6
8	24053	5
8	3006	6
8	375	7
8	46	6
	5	

$(12315581)_{10} = (56765675)_8$

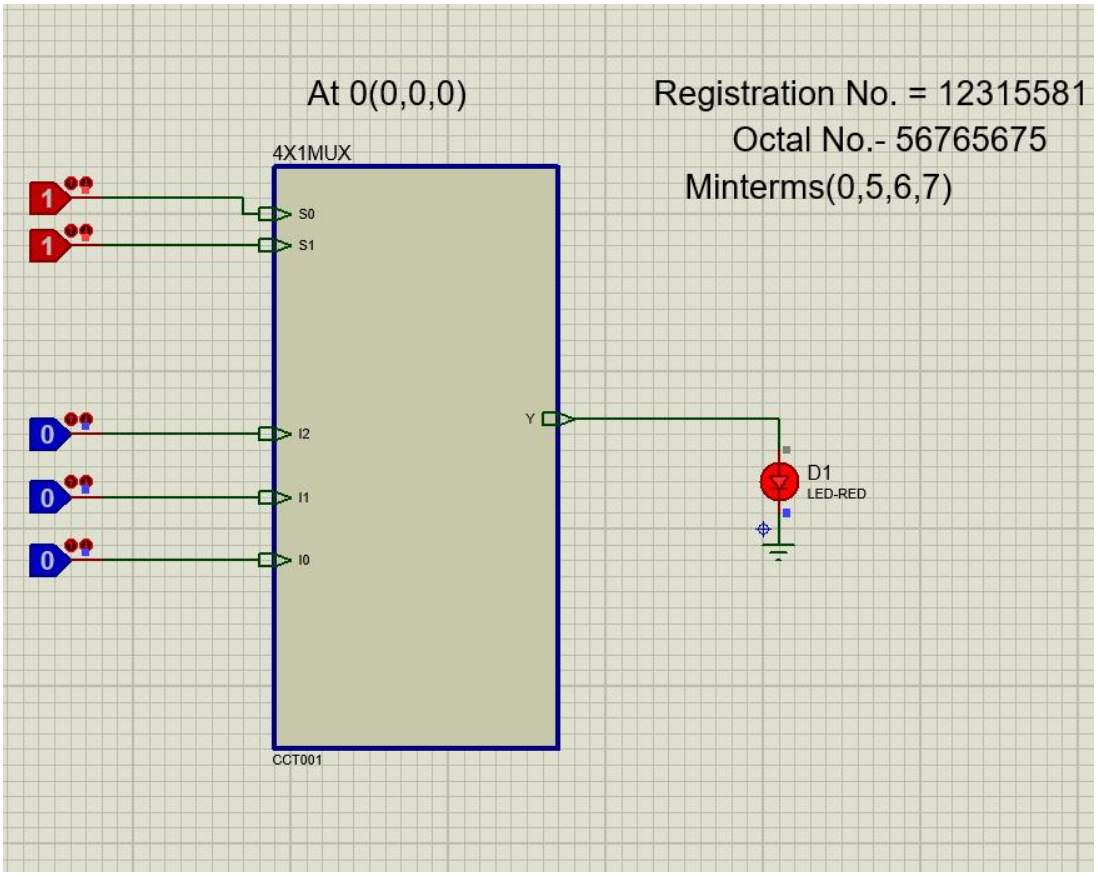
So, for min terms we have to take last 4 digits of octal numbers (i.e. 5675) but 5 is repeating so we are taking 0 another minterm.

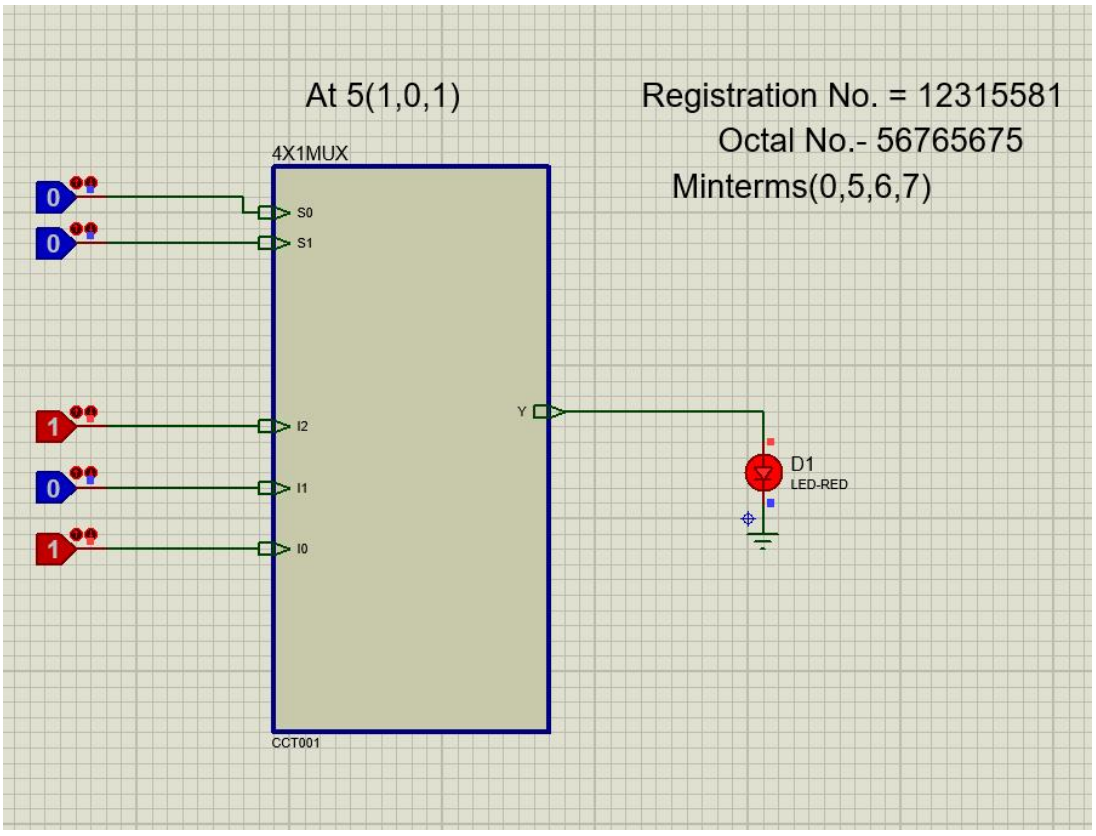
So, $F(A,B,C) = \Sigma(0,5,6,7)$

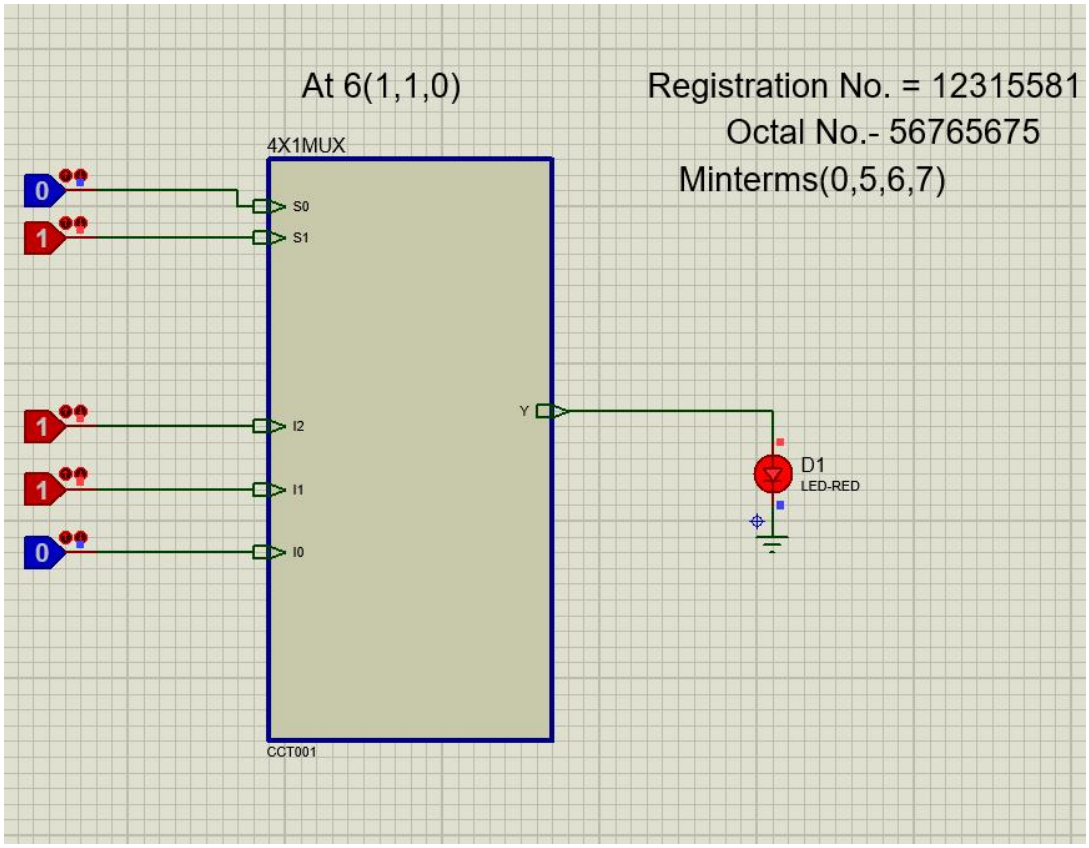
	00	01	10	11
$\bar{A}$	(0)	1	2	3
A	4	(5)	(6)	(7)
	$\bar{A}$	A	A	A

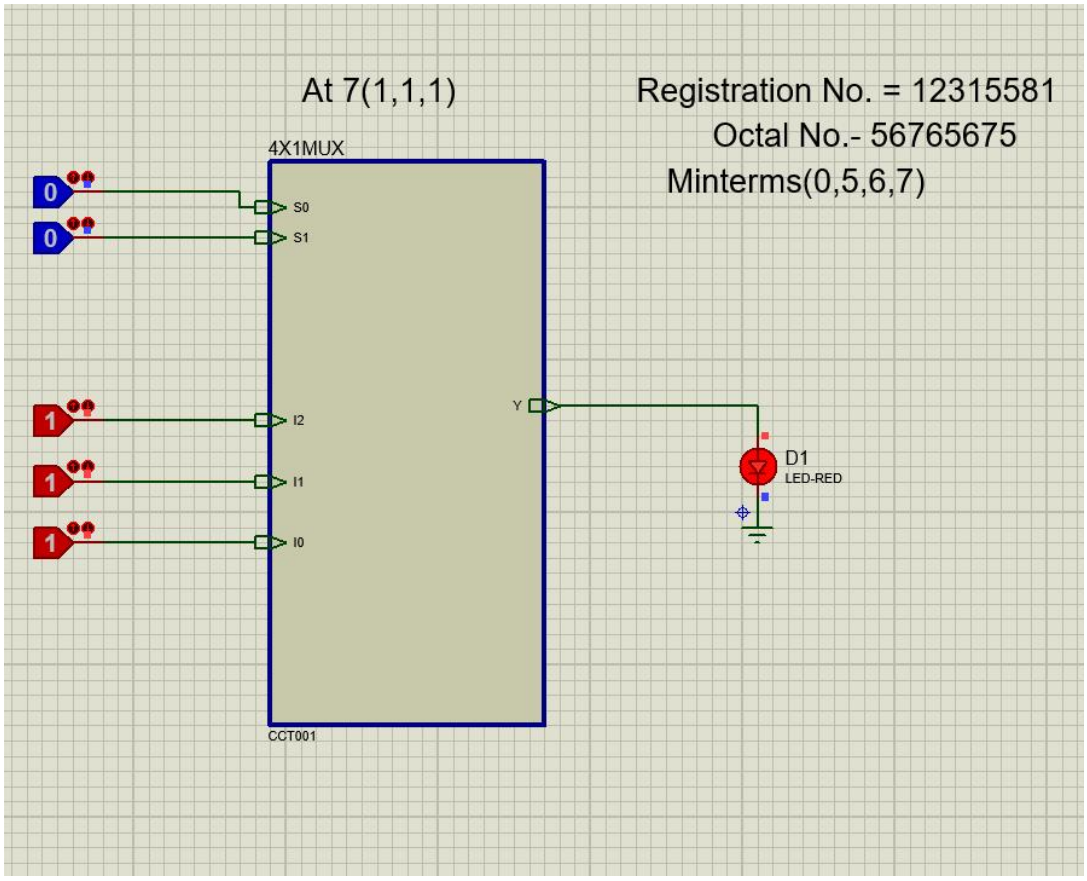
- Bulb will be glow at (0,5,6,7)

A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1


At 0(0,0,0)
Registration No. = 12315581
Octal No.- 56765675
Minterms(0,5,6,7)
4X1MUX
S0
S1
I2
I1
I0
Y
D1
LED-RED
CCT001


At 5(1,0,1)
Registration No. = 12315581
Octal No.- 56765675
Minterms(0,5,6,7)
4X1MUX
S0
S1
I2
I1
I0
Y
D1
LED-RED
CCT001


At 6(1,1,0)
Registration No. = 12315581
Octal No.- 56765675
Minterms(0,5,6,7)
4X1MUX
0
1
S0
S1
1
I2
1
I1
0
I0
Y
D1
LED-RED
CCT001

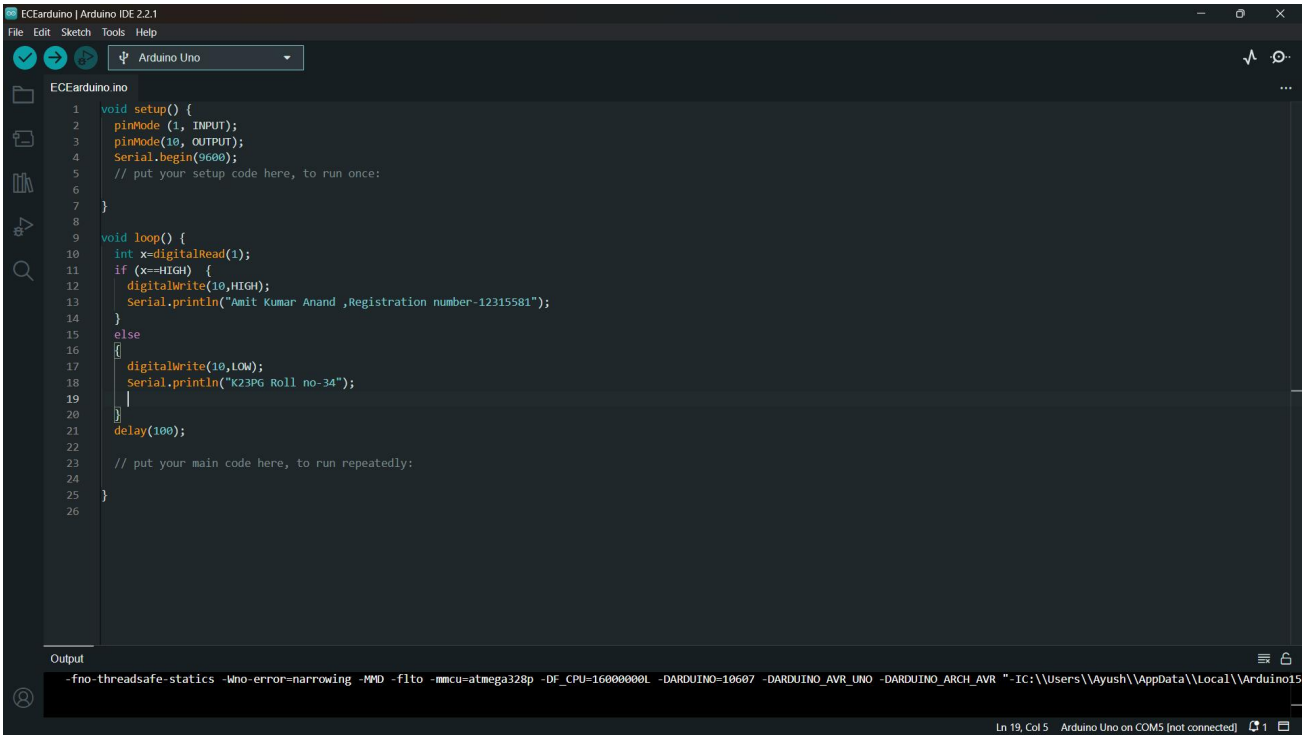

At 7(1,1,1)
Registration No. = 12315581
Octal No.- 56765675
Minterms(0,5,6,7)
4X1MUX
0
0
S0
S1
1
I2
1
I1
1
I0
Y
D1
LED-RED
CCT001

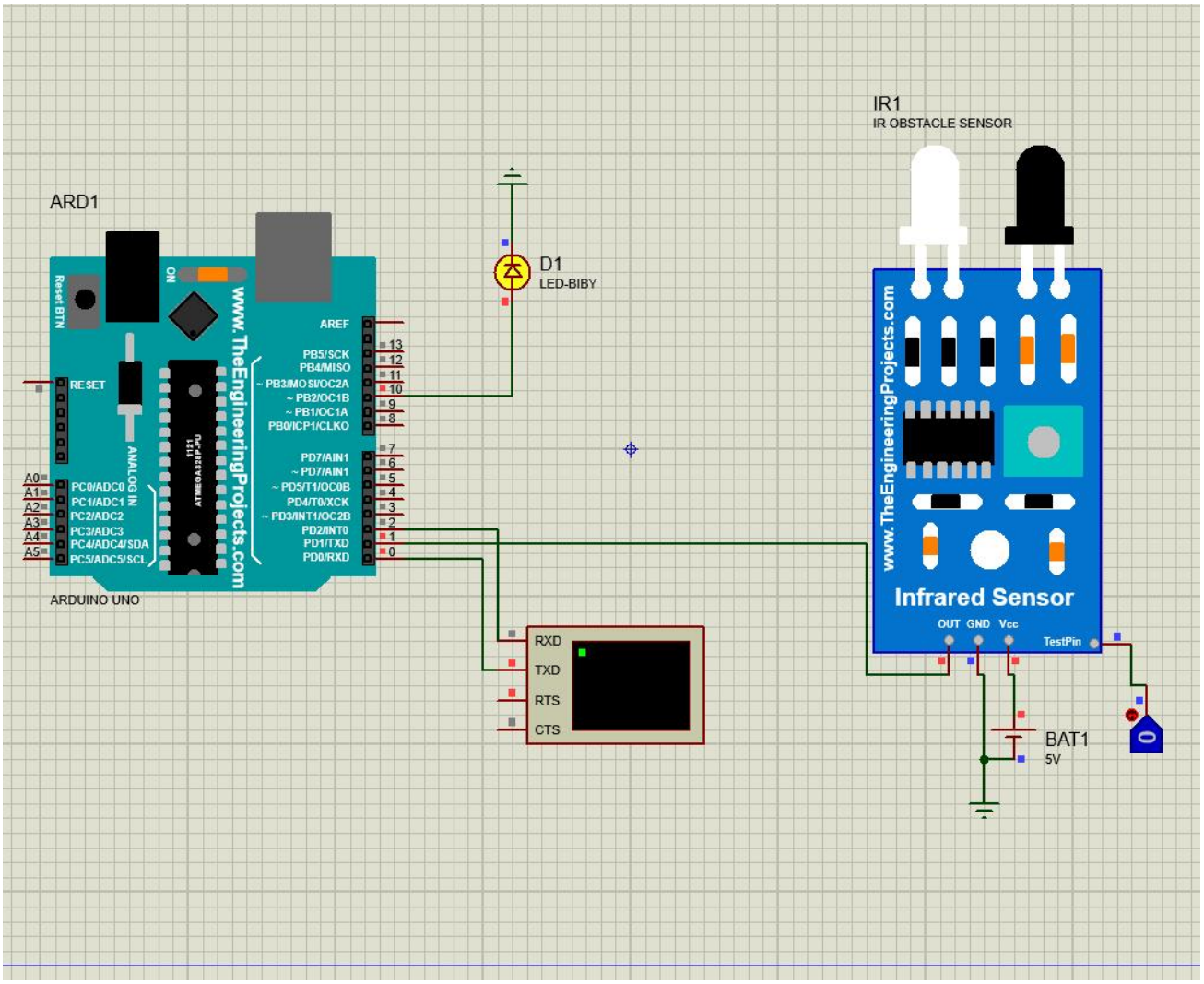
Q.3. Interfacing of IR sensor with an Arduino on Proteus. Note: You need to connect IR sensor on pin no. (Last digit of your registration no. and LED will be connected on pin no. 10).

**For example- if your registration no is 12315532, IR sensor will be connected on pin no. 2. If according to registration number last digit is 0 or 1 then consider input of IR to pin no. 5.

***Display your name and registration on virtual screen if obstacle detected otherwise display your roll number

ANS:- WHEN THERE IS NO OBSTACLE (TOGGLE=0)
ROLL NO IS PRINTED IN VIRTUAL TERMINAL




ARD1
Reset BTN
ON
RESET
ANALOG IN
A0
A1
A2
A3
A4
A5
PC0/ADC0
PC1/ADC1
PC2/ADC2
PC3/ADC3
PC4/ADC4/SDA
PC5/ADC5/SCL
AREF
PB5/SCK
PB4/MISO
~ PB3/MOSI/OC2A
~ PB2/OC1B
~ PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
~ PD7/AIN1
~ PD5/T1/OC0B
PD4/T0/XCK
~ PD3/INT1/OC2B
PD2/INT0
PD1/TXD
PD0/RXD
13
12
11
10
9
8
7
6
5
4
3
2
1
0
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ARDUINO UNO
D1
LED-BIBY
RXD
TXD
RTS
CTS
IR1
IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor
OUT GND Vcc
TestPin
BAT1
5V