Paper 1, TDC Part-1
Chapter– 4, Circuit Theorems
Lecture – 3 Superposition Theorem

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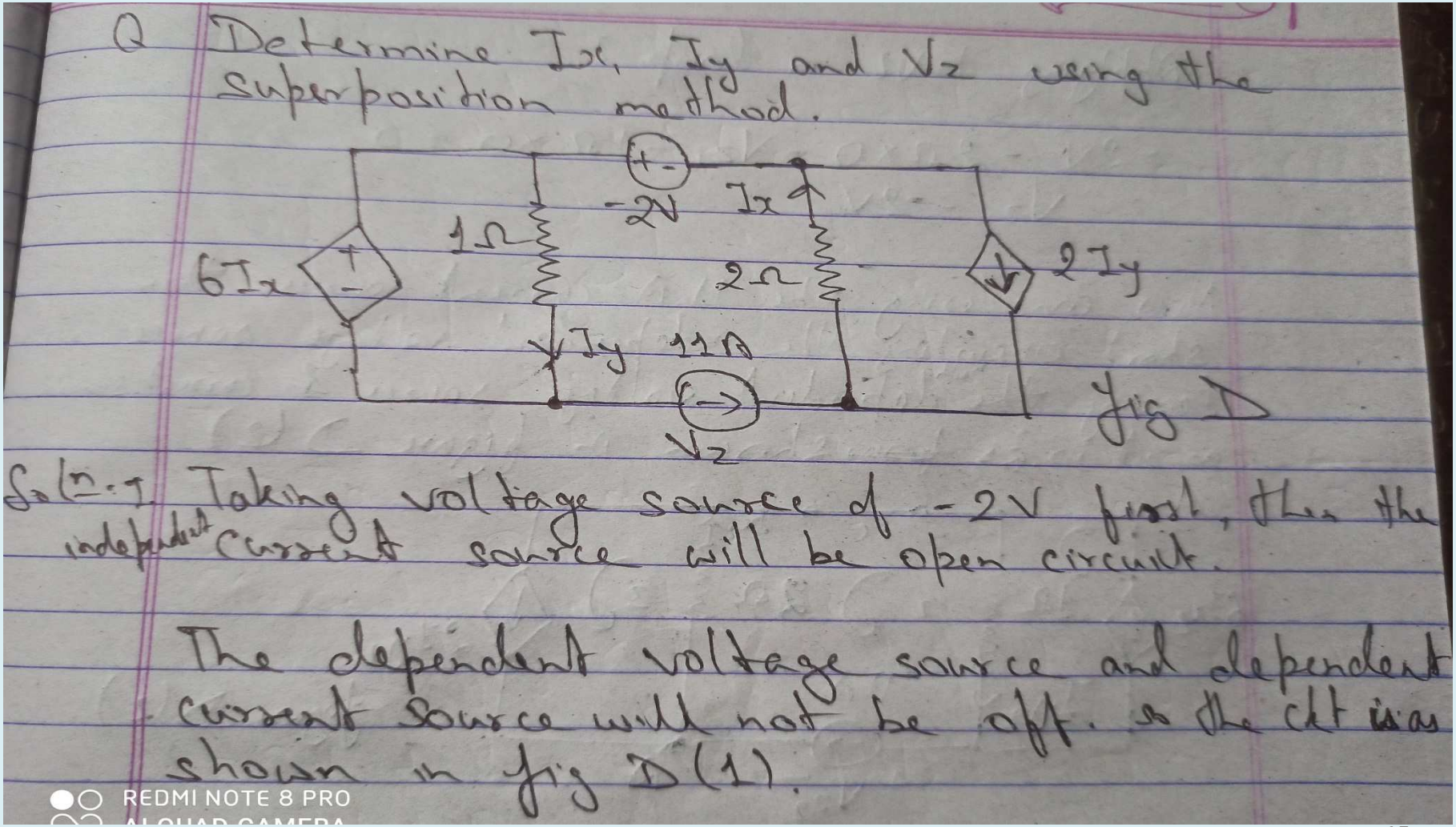
Circuit Theorem – Superposition Theorem

- Today we will discuss problem on circuits with dependent source. It can be either dependent current or dependent voltage source.
- Now let us see fourth example with dependent source.
- In circuit with dependent source, we will never short circuit the dependent voltage source.
- Similarly we will never open circuit the dependent current source.

Circuit Theorem – Superposition Theorem

- Fourth example with dependent source.



Circuit Theorem – Superposition Theorem

shown in fig D(1).

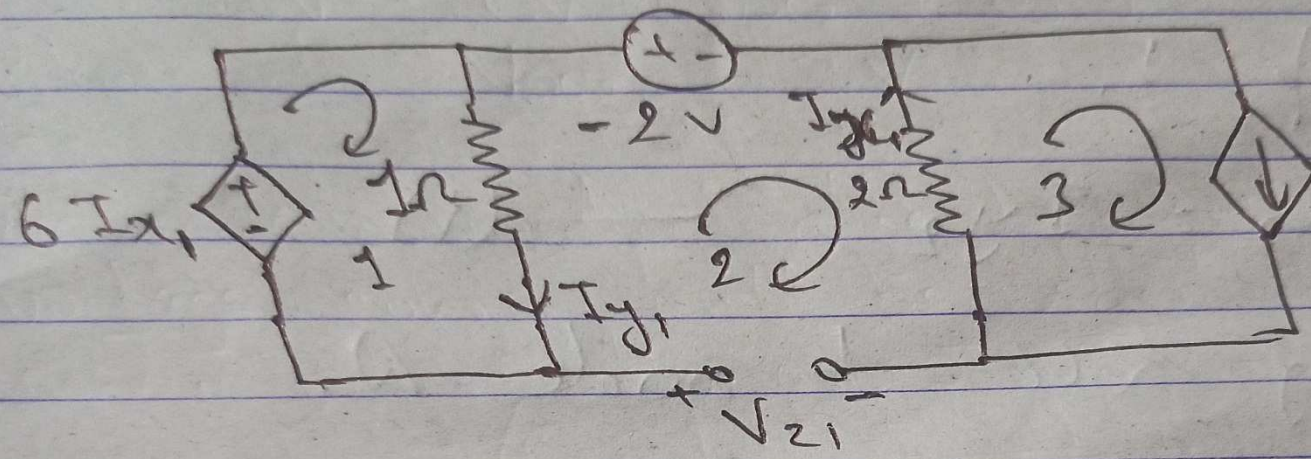


fig D(1)

In loop 1,

$$-6I_{x_1} + 1\Omega \times I_{y_1} = 0$$

$$I_{y_1} = 6I_{x_1}$$

In loop 3,

$$2I_{y_1} = I_{x_1}$$

Therefore $I_{x_1} = I_{y_1} = 0$

Circuit Theorem – Superposition Theorem

Applying KVL in loop 2.

$-2V - 2\Omega \times 0 - V_{2_1} - 1\Omega \times 0 = 0$

$V_{2_1} = -2V$

Now considering the 11 A current source then short circuiting the independent voltage source, while leaving the dependent voltage source & current source as it is. As shown in figure 5 (2)

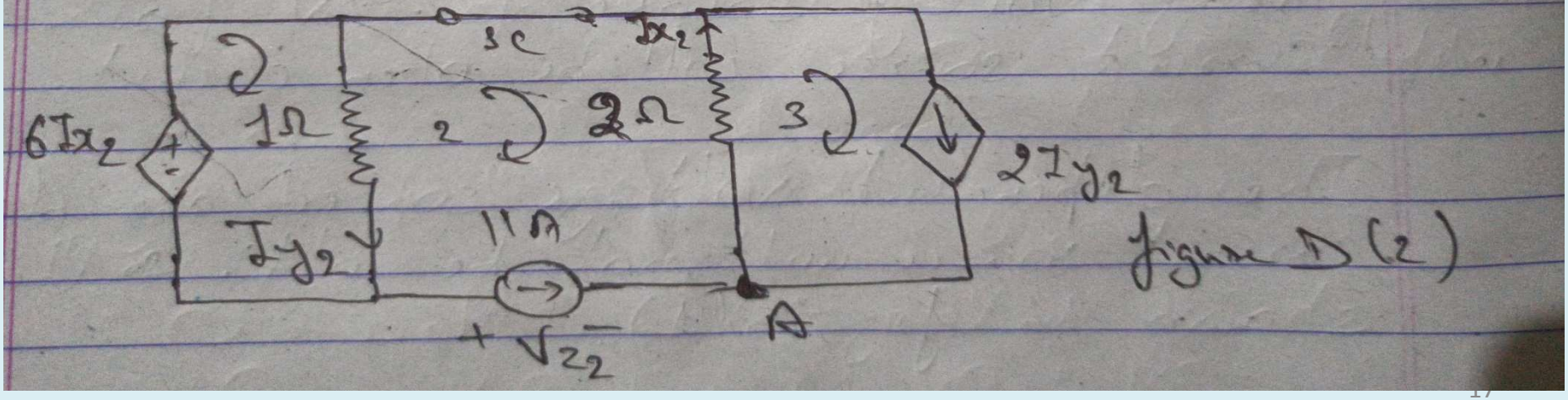


figure 5 (2)

Circuit Theorem – Superposition Theorem

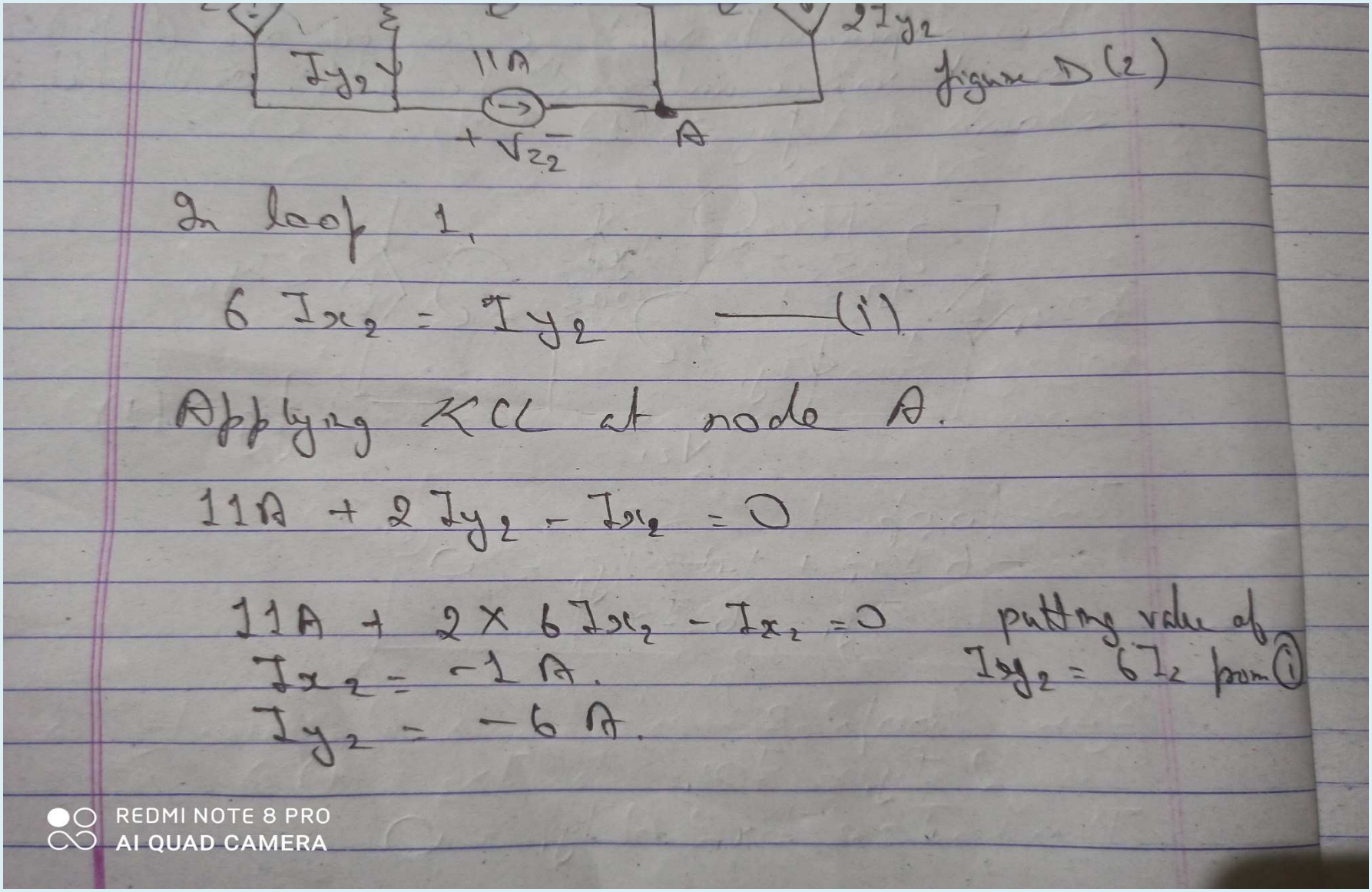


figure 5 (2)

In loop 1,

$$6\, I_{x_2} = I_{y_2} \quad \text{——(i)}$$

Applying KCL at node A.

$$11A + 2\, I_{y_2} - I_{x_2} = 0$$

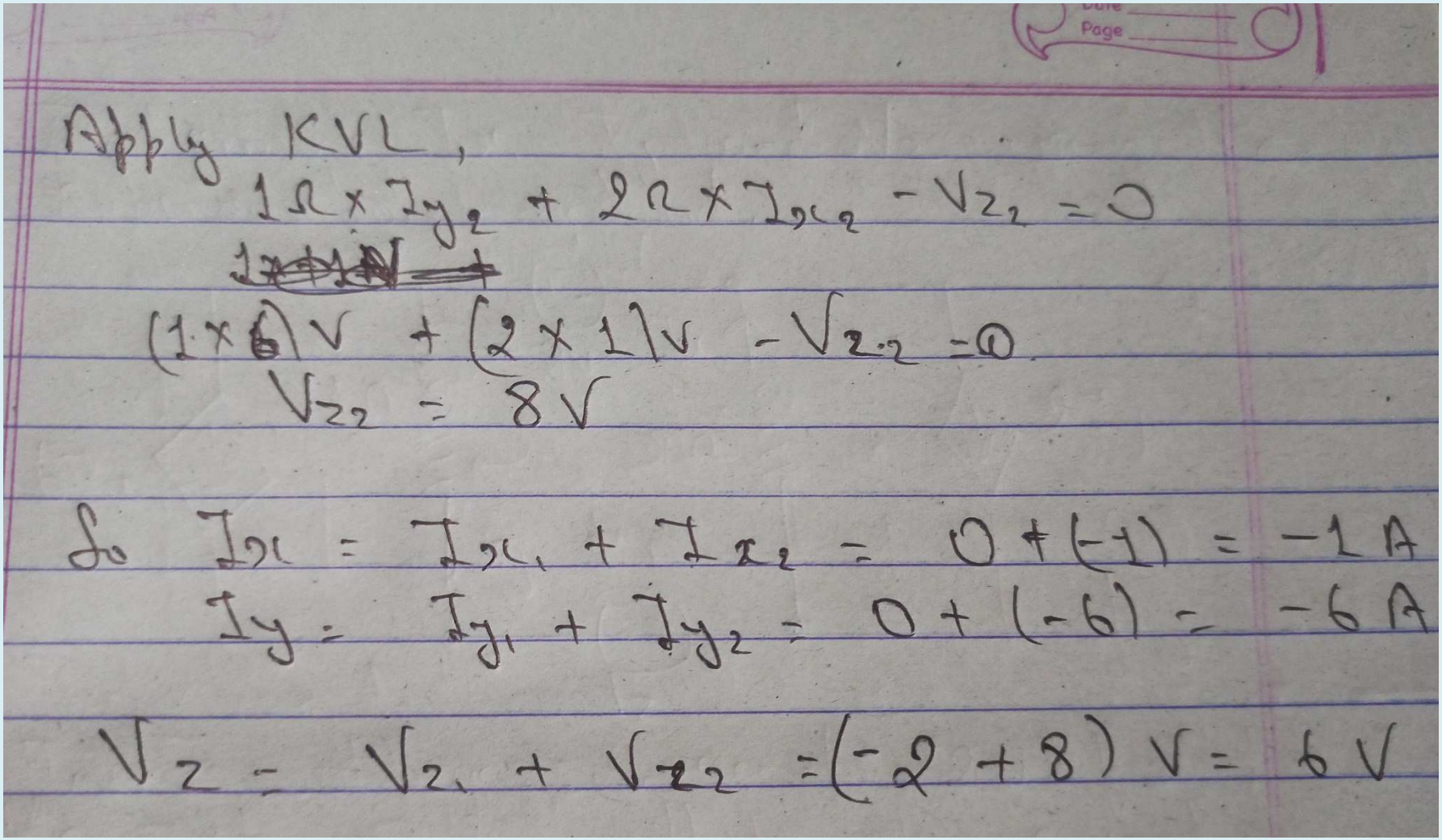
$$11A + 2 \times 6\, I_{x_2} - I_{x_2} = 0$$

putting value of $I_{y_2} = 6I_2$ from (i)

$$I_{x_2} = -1\ A.$$

$$I_{y_2} = -6\ A.$$

Circuit Theorem – Superposition Theorem



Circuit Theorem – Superposition Theorem

For any query contact at “9771474020”.

Thank You