Vidya Jyothi Institute of Technology

(Accredited by NAAC, NBA, Approved by AICTE New Delhi & Permanently Affiliated to JNTUH)

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Title of Innovative method/activity : **Google it–Report writing**

Name of the faculty : V. Vijaya Lakshmi

Designation : Assoc. Prof.

Course Name : Network Analysis

Objective of the Method:

Students are expected to Google the content of the topic available in open source. He/ She is also expected to go through, understand& explore beyond class room. Student will be reporting the concept understood in writing.

Aim of the method:

1. To maximize the learning experience.
2. To identify and prioritize content
3. To identify gaps in understanding

Implementation/Portrayal of method:

1. Use this opportunity to clear up any misconceptions
2. Student will be in a position to present the report prepared.
3. The report can be used for further reference.

Topic Covered through activity: Norton's Theorem

Description of the Method: students were asked to google about Norton theorem statement & procedure to apply the theorem for a given circuit. They were further asked to prepare a report accordingly.

Benefits of the method: students understood how to apply Norton's theorem for a given circuit. This activity enhances communication and writing skills, it further engages the students in self learning.

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Roll.No: 19911A0229

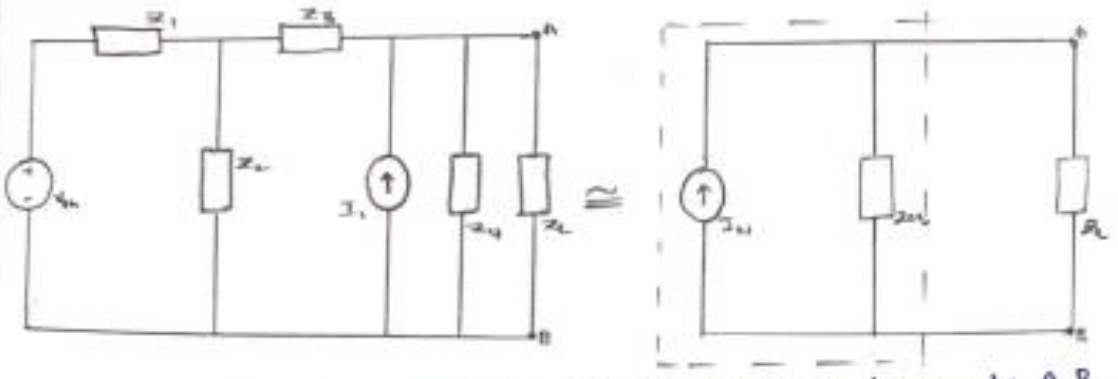
Year/Sem : II-I

Norton's theorem:

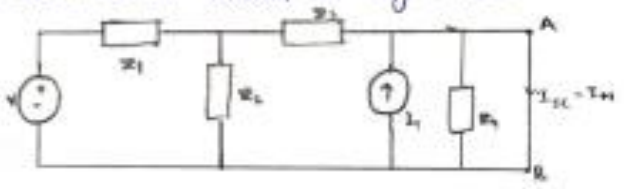
Statement: Any combination of linear bilateral circuit elements and active sources, regardless of connection or complexity, connected to a given load Z_L, can be replaced by a simple two terminal network, consisting a single current source of I_N ampers and a single impedance Z_{eq} in parallel with it, across the two-terminal of the load Z_L. The I_N is the short circuit current flowing through the short circuited path replaced instead of Z_L. It is also called Norton's current. The Z_{eq} is the equivalent impedance of the given network as viewed through the load terminals, with Z_L removed and all the active sources are replaced by short circuit while the independ current sources must be replaced by open circuit, while calculating Z_{eq}.

Explanation of Norton's theorem:

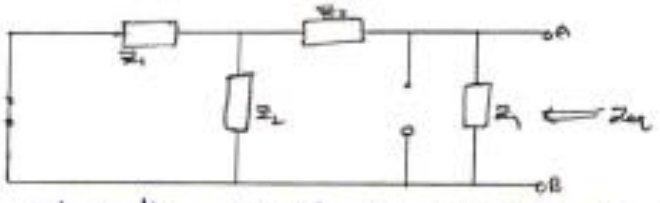
Consider a network shown in figure below. The terminals A-B are load terminals where load impedance Z_L is connected. According to Norton's theorem the entire network can be replaced by a current resource I_N, and an equivalent impedance Z_{eq} in parallel with it, across the load terminals A-B as shown in fig(b)



—for obtaining current I_{SC}. short the load terminals A.B. Calculate the current through the short circuited path by using any of the network amplification techniques this is Norton's current I_N. It is shown in fig below



while the equivalent impedance Z_{eq} is to be obtained by the same procedure as in case of thevinion's theorem.



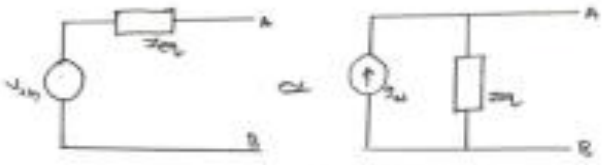
when the circuit is replaced by norton's equivalent across the load terminals, then the load current can be easily obtained by using current division in a parallel circuit as

$$I_L = I_N \cdot \frac{Z_{eq}}{Z_L + Z_{eq}}$$

—this theorem is also called dual of thevenin's theorem. This is because if the thevenin's equivalent voltage source is converted to an equivalent current source, the Norton's equivalent

is obtained. This is shown in fig.

-from source transformation we can write



$I_N = \frac{V_{th}}{Z_{eq}}$

or $Z_{eq} = \frac{V_{th}}{I_N}$

Steps to Apply Norton's theorem:

step-1 :- short the branch through which the current is to be calculated by removing the impedance between the terminals

step-2 :- obtain the current through this short circuited branch, using any of the network simplification techniques - this current is nothing but Norton's current I_N.

step-3 :- calculate the equivalent impedance Z_{eq} as viewed through the two terminals of interest by removing the branch impedance and making all the independent sources inactive

step-4 :- Draw the Norton's equivalent across the terminals of interest, showing a current source I_N with the impedance Z_{eq} parallel with it. Reconnect the branch impedance now let it be Z_L. the current through the branch of interest is

$$I = I_N \times \frac{Z_{eq}}{Z_{eq}+Z_L}$$

Note: If dependent sources are present in the circuit - then

$$Z_{eq} = \frac{V_{th}}{}$$

Outcome: Many students suggest that using the Google it-report writing strategy supported their ability to effectively explore and integrate the topic and create flow and linkage amongst when writing their report.

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