Subject Code - 202 (Circuit Analysis)
II - Test
15/01/15

Q1). State Thevenin's Theorem?

Q2). State Norton's Theorem?

Q3). for Z, Y, h, T Parameters write Voltage and current Relationship?

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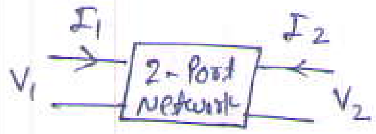
Soll. ① Z- Parameter:-

$$V_1 = Z_{11} I_1 + Z_{12} I_2 \quad \text{— ①}$$
$$V_2 = Z_{21} I_1 + Z_{22} I_2 \quad \text{— ②}$$



$$\Rightarrow [V] = [Z][I]$$

$$\begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} Z_{11} & Z_{12} \\ Z_{21} & Z_{22} \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix}$$

②. Y- Parameter:-

$$I_1 = Y_{11} V_1 + Y_{12} V_2 \quad \text{— ①}$$
$$I_2 = Y_{21} V_1 + Y_{22} V_2 \quad \text{— ②}$$

$$\begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} Y_{11} & Y_{12} \\ Y_{21} & Y_{22} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix}$$

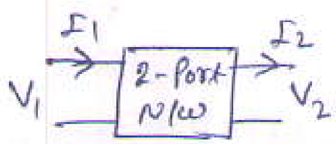
③ h- Parameter:-

$$V_1 = h_{11} I_1 + h_{12} V_2 \quad \text{— ①}$$
$$I_2 = h_{21} I_1 + h_{22} V_2 \quad \text{— ②}$$

$$\begin{bmatrix} V_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} h_{11} & h_{12} \\ h_{21} & h_{22} \end{bmatrix} \begin{bmatrix} V_1 \\ I_2 \end{bmatrix}$$

④ T / ABCD - Parameter:-

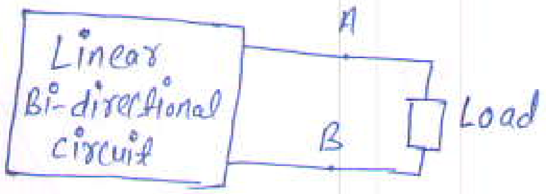
$$V_1 = AV_2 - BI_2 \quad \text{— ①}$$
$$I_1 = CV_2 - DI_2 \quad \text{— ②}$$



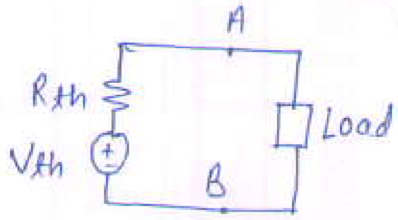
Q2) State Thevenins Theorem?

Ans: Thevenins Theorem:-

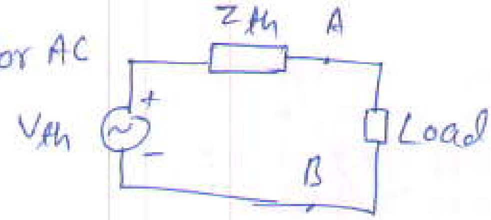
"In any linear, Bi-directional ckt having more number of active and passive components, it can be Replaced by single equivalent circuit consisting of equivalent Voltage source (V_{th}) and in series with equivalent Resistance (R_{th})."



for DC



for AC



V_{th}:- The Thevenin voltage V_{th} is an ideal Voltage source equal to the open ckt Voltage at the load terminals.

R_{th}:- The Thevenins Resistance R_{th} is the equivalent Resistance measured at load terminals (AB) with All sources deactivated.

Source	To deactivate
① Voltage source →	Short ckt
② Current source →	Open ckt.

Application:-

Thevenin's Theorem is especially useful in the circuit Analysis of power or battery systems and other interconnected resistive circuits where it will have an Effect on an adjoining part of the circuit.

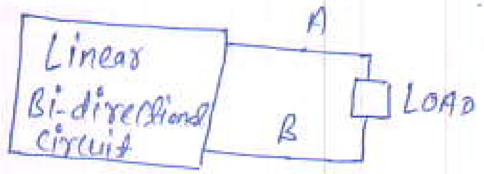
Procedure:-

① Identify the Load terminal, Remove the Load Resistor R_L or component concerned.
② find the open ckt Voltage (V_{th}) across the load terminals.
③. deactive all the independent sources and find equivalent Resistance R_{th} across the load.
④. Draw Equivalent Thevenins Circuit, Connect the Load and find the Current

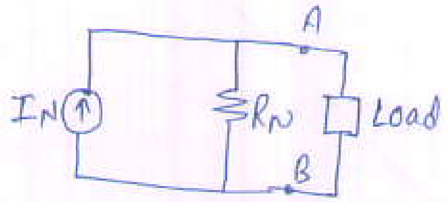
Q3) State Norton's Theorem?

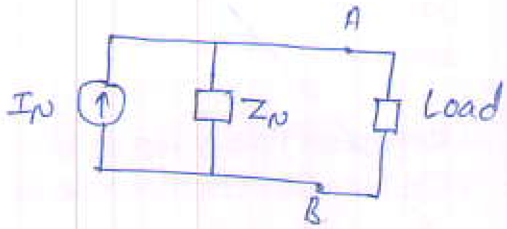
Sol):- <u>Norton's Theorem</u>:-

In any linear, Bi-directional ckt having more number of Active and Passive elements, It can be Replaced by equivalent circuit, Consisting of equivalent current source (I_N) in Parallel with Equivalent Resistance (R_N).



for DC





I_N:- The Norton's current I_N is an Ideal current source Equal to the short circuit current flowing through the Load terminal.

R_N:- The Norton's Resistance R_N, is the Equivalent Resistance measured at load terminals (AB) with all sources deactivated.

$$\boxed{R_N = R_{th}}$$

Procedure:- the Basic Procedure for solving a circuit using Nortons theorem is as follows-

① . Identify the Load terminal, Remove the Load Resistor or Component Concerned.

② . short circuit the Load terminal and find short circuit current (I_N).

③ . Deactive all the Independent sources and find Equivalent Resistance across the load terminal.

④ . Draw Equivalent Norton's Circuit, connect the Load and find the current flowing through the Load.