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Find V_{TH} , R_{TH} and the load current I_L flowing through and load voltage across the load resistor in the circuit below using Thevenin's theorem. The document provides solved problems related to Thevenin's theorem. Thevenin's theorem implies that we can replace arbitrarily complicated networks with simple networks for purposes of analysis. Thevenin's and Norton's Theorems. Soln: Step 1. Find R_{TH} by turning off the voltage source (replacing it with a short circuit) and the 2A current source (replacing it with open circuit). Problems – In class. It includes questions and their step-by-step solutions. This is the Thevenin Voltage (V_{TH}) Find the Thevenin equivalent of the circuit shown below across terminals a-b. Now, we should find an equivalent circuit that contains only an independent voltage source in series with a resistor. Find V_o using Thevenin's theorem. is the open circuit voltage shown in Fig. (a). Kirchhoff's laws: $\sum v = 0$ and $\sum i = 0$. Kirchhoff's current law (KCL): $\sum i_k = 0$ at each node. Then find the current through $R_L = 6\Omega$ and 2Ω respectively. We can replace the shaded part of the circuit with its Thevenin equivalent circuit. Solving the following simultaneous equations: $4y = x + y$, $x = y + I_{SC}$. Thevenin's resistance is $R_{TH} = V_{TH} / I_{SC}$. Thevenin and Norton equivalent circuits as shown in Figure 1. Thevenin's Equivalent and Norton's Equivalent Figure 1. Determine the Thevenin and Norton equivalent circuits for the circuit shown in Figure 1. Problems – In class. Unknowns are V_{TH} and R_{TH} . First, let us consider R_L as the load resistor. Solution: Let's break the circuit at the load as shown in Fig. (a). e.g., at node B, $i_3 + i_6 + i_4 = 0$. (We have followed the convention that current leaving a node is positive.) Solved Problem: Solve the given circuit to find the current through 2Ω using Thevenin's Theorem. Problem: Find the Thevenin equivalent circuit for the following circuit with respect to the terminals AB (Irwin – Example). Problems – In class. Figure 1. The following sequence of steps will lead to the proper value of R_{TH} and V_{TH} . [1] A Source of Free Solved Problems: Thevenin's Theorem. Circuit with Two Independent Sources: Use Thevenin's theorem to determine. STEP 1: Calculate the open circuit voltage. Calculate V_{TH} . Thevenin's equivalent circuit: Thevenin's Theorem: Any circuit with sources (dependent and/or independent) and resistors can be replaced by an equivalent circuit containing a single voltage source and a single resistor. Solution: STEP 2: Open the $5k\Omega$ load resistor (Fig 2). Now the circuit is open-circuited. Solved Example by Thevenin's Theorem: Example: Find V_{TH} , R_{TH} and the load current I_L flowing through and load voltage across the load resistor in Fig. (1) by using Thevenin's Theorem. (a) To find Thevenin's voltage, Remove the load resistor (2Ω) and the circuit is redrawn as below. Find I_o using Thevenin's or Norton's theorem. Thevenin's Theorem Statement: Any linear, bilateral network with two terminals can be replaced by a single voltage source V_{TH} in series with an impedance Z_{TH} , where V_{TH} is an open circuit voltage at the terminals and Z_{TH} is the equivalent impedance as viewed from the terminals. Problem: Find the Thevenin equivalent circuit for the circuit shown in Fig. (a). The first question calculates the Thevenin voltage. Home 1) Find current flowing through resistor. 10Ω in series with a resistor, as shown in Fig. (a). There are following steps required to solve the Thevenin's theorem questions. A. Any Linear Theory and Methodology: Thevenin's theorem states that: "Any two-terminal linear bilateral dc network can be replaced by an equivalent circuit consisting of a voltage source and a series resistor" [1]. Step 2: E Analysis of Circuits (a) Thevenin and Norton – Thevenin Theorem: Any two-terminal network consisting of resistors, fixed voltage/current sources and linear dependent sources is externally equivalent to a circuit consisting of a resistor in series with a fixed voltage source. Identify the load resistance value of R_L . Remove the load resistance and calculate the open circuit voltage. Thevenin's Theorem Solved Example. Problems – In class. Now, we should find an equivalent circuit that contains only an independent voltage source in series with a resistor.