```
\documentclass[multi=false, tikz, border=2mm]{article}
\usepackage[siunitx]{circuitikz}
\usepackage{graphicx}
\usepackage{float}
\usepackage[center]{caption}
\usepackage{amsmath}
\usepackage{mathptmx}
\usepackage{tikz}
\usepackage[colorlinks=true, allcolors=blue, unicode]{hyperref}
\usetikzlibrary{arrows, decorations.markings}
\usepackage[romanian]{babel}
\usepackage[export]{adjustbox}
\usepackage[skins, theorems]{tcolorbox}
\tcbset{highlight math style = {enhanced, colframe=red, colback=white, arc=0pt, boxrul
\newcommand\tab[1][0.6cm]{\hspace*{#1}}
\usepackage{fancyhdr}
\renewcommand{\headrulewidth}{2pt}
\renewcommand{\footrulewidth}{1pt}
\usepackage{listings}
\usepackage{color} %red, green, blue, yellow, cyan, magenta, black, white
\definecolor{mygreen}{RGB}{28,172,0} % color values Red, Green, Blue
\definecolor{mylilas}{RGB}{170,55,241}
\pagestyle{fancy}
\title{TEMA ELTH}
\author{Petruc Rares}
\fancyhf{}
\rhead{Petruc Rares}
\lhead{TEMA ELTH}
\rfoot{Pagina \thepage}

\begin{document}

\lstset{language=Matlab,%
    %basicstyle=\color{red},
    breaklines=true,%
    morekeywords={matlab2tikz},
    keywordstyle=\color{blue},%
    morekeywords=[2]{1}, keywordstyle=[2]{\color{black}},
    identifierstyle=\color{black},%
    stringstyle=\color{mylilas},
    commentstyle=\color{mygreen},%
    showstringspaces=false,%without this there will be a symbol in the places where th
    numbers=left,%
    numberstyle={\tiny \color{black}},% size of the numbers
    numbersep=9pt, % this defines how far the numbers are from the text
    emph=[1]{for,end,break},emphstyle=[1]\color{red}, %some words to emphasise
    %emph=[2]{word1,word2}, emphstyle=[2]{style},
}

\thispagestyle{plain}
\begin{center}

    \Large
    \textbf{TEMA}

    \vspace{0.4cm}
    \large
    -Bazele Electrotehnicii-

    \vspace{4cm}
```

```
\end{center}


\vspace{0.9cm}
\textbf{Abstract} Documentul de mai jos reprezinta tema mea la Electrotehnica, tema pe
timp de lucru mediu de 5-6 ore pe zi. Am urmarit indeaproape metodele prezentate in br
cu ajutorul carora am rezolvat cerintele propuse in tema.

Cu mult ajutor de pe paginile Overleaf, Stack Exchange, dar mai ales din arhiva pusa l
v4), am reusit sa duc tema la bun sfarsit, sa aiba un aspect placut, si sper ca am int

\vspace{4cm}

\noindent
\makebox[\textwidth][r]{
    \begin{minipage}{0.5\textwidth}
    Petruc Rares\\
    Grupa 312CD\\
    Facultatea de Automatica si Calculatoare\\
    Universitatea Politehnica din Bucuresti\\
    03.05.2020\\
\end{minipage}
}

\renewcommand\tablename{Tabelul}
\date{\today}  % sau puneti data explicit - va ramane fixata
\pagebreak

    % aici am modificat contentsname default
    % in "Cuprins"

    \renewcommand*\contentsname{Cuprins}

    \tableofcontents

    \pagebreak

    \section{Generarea unui circuit}
        \label{task1}
        \tab {\color{purple}{\bf Primul pas}} in generarea circuitului electric cu sol
        grafuri, unul de curenti si unul de tensiuni si a unui arbore, dupa care m-am
        tensiuni pe coarde.


    \begin{figure}[H]
    \begin{minipage}{0.5\textwidth}
            \centering
            \begin{circuitikz}[american]
                \draw(0, 0) to [short, i = -1<\ampere>, *-*] (4, 0);
                \draw(4, 0) to (4, -4);
                \draw(4, -4) to [short, i = 6<\ampere>, *-*](0, -4);
                \draw(0, -4) to (0, 0);
                \draw(0, -4) -- (1, -3) to [short, i = 3<\ampere>] (3, -1) to (4, 0);
                \draw(0, -4) -- (0, -6) to (4, -6) to (4, -4);
                ;
            \end{circuitikz}
    \end{minipage}
    \begin{minipage}{0.5\textwidth}
            \centering
```

```
        \begin{circuitikz}[american]
            \tikzset{myptr/.style={decoration={markings, mark=at position 1 with {
                    postaction={decorate}}}
            \draw [myptr, *-*](0, 0) -- (0, 4) node[midway, left] {\SI{-1}{\volt}}
            \draw [myptr](0, 4) -- (4, 4);
            \draw [myptr](4, 4) -- (4, 0) node[midway, right] {{\SI{-2}{\volt}}};
            \draw [myptr](4, 0) -- (0, 0);
            \draw [myptr](0, 0) --(4, 4);
            \draw [myptr]node[left] {A}(0, 0) -- (0, -2) -- (4, -2) node[midway, a
        \end{circuitikz}
\end{minipage}
\caption{Grafurile initial: stanga - graful de curenti; dreapta - graful de tensiu
\label{fig:grafuri_initial}
\end{figure}

 {\color{purple}{\bf Al doilea pas}} in generarea circuitului a fost sa completez
 cu ajutorul teoremei lui Tellegen.

\begin{figure}[H]
\begin{minipage}{0.5\textwidth}
    \centering
    \begin{circuitikz}[american]
        \draw(0, 0) to [short, i = -1<\ampere>, *-*] (4, 0);
        \draw(4, 0) to [short, i = 2<\ampere>, red](4, -4);
        \draw(4, -4) to [short, i = 6<\ampere>, *-*](0, -4);
        \draw(0, -4) to [short, i = -1<\ampere>, red](0, 0);
        \draw(0, -4) -- (1, -3) to [short, i = 3<\ampere>] (3, -1) to (4, 0);
        \draw(0, -4) -- (0, -6) to [short, i = 4<\ampere>, red] (4, -6) to (4, -4)
        ;
    \end{circuitikz}
\end{minipage}
\begin{minipage}{0.5\textwidth}
    \centering
    \begin{circuitikz}[american]
        \tikzset{myptr/.style={decoration={markings, mark=at position 1 with {\arr
                postaction={decorate}}}
        \draw [myptr, *-*](0, 0) -- (0, 4) node[midway, left] {\SI{-1}{\volt}};
        \draw [myptr](0, 4) -- (4, 4) node[midway, above, red] {\SI{-3}{\volt}};
        \draw [myptr](4, 4) -- (4, 0) node[midway, right] {{\SI{-2}{\volt}}};
        \draw [myptr](4, 0) -- (0, 0) node[midway, above, red] {\SI{6}{\volt}};
        \draw [myptr](0, 0) --(4, 4) node[midway, left, red] {\SI{-4}{\volt}};
        \draw [myptr]node[left] {A}(0, 0) -- (0, -2) -- (4, -2) node[midway, above
    \end{circuitikz}
\end{minipage}
\caption{Solutia circuitului generat: stanga - graful de curenti; dreapta - graful
\label{fig:grafuri_final}
\end{figure}
\pagebreak

\begin{equation} \label{eq: Orice}
\tcbhighmath[colframe=blue, drop fuzzy shadow = green]{
\begin{aligned}
P_{R} &= (-1)\cdot(-1) + (6)\cdot6 + 3\cdot(-4) + (4)\cdot(-6) + (-1)\cdot(-3) + 2
P_{G} &= 0 W.
\end{aligned}}
\end{equation}

Relatiile din \ref{eq: Orice} valideaza corectitudinea valorilor curentilor si ten
{\color{purple}{\bf pasul 3}}, in care completam laturile cu elementele cerute in
convenabile.
```

```
\begin{figure}[H]
        \centering
    \begin{circuitikz}[american]
        \draw(0, 0) to [R, l = 1<\ohm>, *-*](0,4) % R1
         (2, 4) to [V, l_ = 2<\volt>] (0, 4) % V2
         (2, 4) to [R, l = 1<\ohm>] (4, 4) % R2
         (4, 4) to [I, l = 2<\ampere>, *-*] (4, 0) % J1
         (4, 0)to [R, l=1<\ohm>] (0, 0) % R3
         %(0, 0) to [V, l_=1<\volt>](2, 0) % V3
        (0, 0) -- (0, -2) to [I, l_=4<\ampere>](4, -2) -- (4, 0) % J2

        (4, 4) -- (3, 3) to [V, l = 4<\volt>] (1, 1) -- (0, 0) %V2
    ;
    \end{circuitikz}
    \caption{Circuit.}\label{fig: circuit}
    \end{figure}

Din fig. \ref{fig: circuit}, reis urmatoarele caracteristici topologice ale circui

\begin{table}[h]
\caption{Topologia circuitului.}\label{tab: tab_top}
\begin{center}
\begin{tabular}{|c|}
        \hline
        Topologie\\
        \hline
        L = 6\\
        \hline
        N = 4\\
        \hline
        $n_{SIC}$ = 2\\
        \hline
        $n_{SIT}$ = 2\\
        \hline
\end{tabular}
\end{center}
\end{table}

\pagebreak

\section{Metode sistematice eficiente}
\tab In cadrul acestui task, am analizat care ar fi cea mai eficienta metoda pentr
circuit}} si, conform acesteia, am rezolvat circuitul.
\vspace{-0.4cm}
\subsection{Tabel metode}
\tab Din tabelul \ref{tab: tab_top} reies urmatoarele date:
\vspace{-0.2cm}
\begin{table}[h]
\begin{center}
\caption{Tabel metode.}\label{tab_metode}
\begin{tabular}{|p{10cm}|l|}
        \hline
        Metoda & Numar de ecuatii\\
        \hline
        \hline
        Kirchoff clasic & 2L = 12\\
        \hline
        Kirchoff in curenti & L $-$ N $+$ 1 $=$ 3\\
        \hline
```

```
            Kirchoff in tensiuni & N $-$ 1 = 3\\
            \hline
            Curenti de coarde (curenti de bucle/curenti cilcici) & L $-$ N $+$ 1 $-$ $
            \hline
            Tensiuni in ramuri(potentiale ale nodurilor daca SIT formeaza un subgraf c
            \hline
    \end{tabular}
    \end{center}
    \end{table}

\vspace{-0.9cm}
    \subsection{Rezolvarea circuitului cu metoda cea mai eficienta}
    Observam din tabelul \ref{tab_metode} ca avem acelasi numar de ecuatii, fie ca est
    tensiunilor in ramuri. Voi alege in redactare metoda curentilor in coarde.\\
    \tab Marchez cu rosu arborele normal si generez bucla [1], bucla generata de coard

    \begin{figure}[H]\centering
    \begin{circuitikz}[american]

        \draw(0, 0) to [R, l = 1<\ohm>, *-*, i = ${I}$](0,4) % R1
        (2, 4) to [V, l_ = 2<\volt>, i = ${I}$] (0, 4) % V2
        (2, 4) to [R, l = 1<\ohm>] (4, 4) % R2;
        (4, 4) to [I, l = 2<\ampere>, *-*, i = ${2A}$] (4, 0) % J1
        (4, 0)to [R, l=1<\ohm>, i = ${6A}$] (0, 0) % R3
        %(0, 0) to [V, l_=1<\volt>](2, 0) % V3
        (0, 0) -- (0, -2) to [I, l_=4<\ampere>, *-*, i = ${4A}$](4, -2) -- (4, 0) % J2
        (4, 4) -- (3, 3) to [V, l = 4<\volt>, i = ${2A-I}$] (1, 1) -- (0, 0) %V2
        ;

        % reprezentarea arborelui normal:

        \draw[red, line width = 0.5mm](4, 4) -- (0, 4) (4, 4) -- (0, 0) (0, 0) -- (4,

        % reprezentarea buclelor:
        \draw[green] (0.8, 2) to [short, i = ${[1]}$](0.8, 3) -- (1.5, 3) -- (0.8, 2);

    \end{circuitikz}
    \caption{Circuit + arbore normal.}\label{fig: rezolvare_circuit}
    \end{figure}

    \begin{center}

    Scriem Kirchoff II pentru bucla independenta aleasa la pasul anterior:
    \begin{equation} \label{eq: ec1}
        [1]: 1\cdot{I} + 1\cdot{I} = 2 - 4,
    \end{equation}

     din \ref{eq: ec1} reiese banal ca:
     \begin{equation} \label{eq: ec2}
        2\cdot{I} = -2 => I = {\SI{-1}{\ampere}}.
    \end{equation}
    \end{center}

    \tab Acum putem completa grafurile de curenti si tensiuni (Fig. \ref{fig: gdc} si
    cu grafurile generate in Fig. \ref{fig:grafuri_final}:


    \begin{minipage}{0.5\textwidth}
    \begin{figure}[H]
    \centering
```

```
\begin{circuitikz}[american]
    \draw(0, 0) to [short, i = -1<\ampere>, *-*] (4, 0);
    \draw(4, 0) to [short, i = 2<\ampere>](4, -4);
    \draw(4, -4) to [short, i = 6<\ampere>, *-*](0, -4);
    \draw(0, -4) to [short, i = -1<\ampere>](0, 0);
    \draw(0, -4) -- (1, -3) to [short, i = 3<\ampere>] (3, -1) to (4, 0);
    \draw(0, -4) -- (0, -6) to [short, i = 4<\ampere>] (4, -6) to (4, -4);
    ;
\end{circuitikz}
\caption{Graful de curenti.}\label{fig: gdc}
\end{figure}
\end{minipage}
\begin{minipage}{0.5\textwidth}
\begin{figure}[H]
\centering
\begin{circuitikz}[american]
\tikzset{myptr/.style={decoration={markings, mark=at position 1 with {\arrow[scale
        postaction={decorate}}}
    \draw [myptr, *-*](0, 0) -- (0, 4) node[midway, left] {\SI{-1}{\volt}};
    \draw [myptr](0, 4) -- (4, 4) node[midway, above] {\SI{-3}{\volt}};
    \draw [myptr](4, 4) -- (4, 0) node[midway, right] {{\SI{-2}{\volt}}};
    \draw [myptr](4, 0) -- (0, 0) node[midway, above] {\SI{6}{\volt}};
    \draw [myptr](0, 0) --(4, 4) node[midway, left] {\SI{-4}{\volt}};
    \draw [myptr]node[left] {A}(0, 0) -- (0, -2) -- (4, -2) node[midway, above] {{
\end{circuitikz}
\caption{Graful de tensiuni.}\label{fig: gdu}
\end{figure}
\end{minipage}

\pagebreak
\section{Generatorul echivalent de tensiune}
\vspace{-.25cm}
\subsection{Echivalarea circuitului fata de bornele A si B}
\begin{samepage}
\begin{figure}[H]
\centering

% TOT CE ESTE PUS DUPA '%' LA FINAL DE RAND REPEZINTA
% ELEMENTUL CORESPUNZATOR LINIEI IN LTSPICE

\begin{circuitikz}[american]

    \draw (2, 4) to [V, l_ = 2<\volt>, -*] node[above = 0.1cm]{B}(0, 4) % V2
    (2, 4) to [R, l = 1<\ohm>] (4, 4) % R2
    (4, 4) to [I, l = 2<\ampere>, *-*] (4, 0) % J1
    (4, 0)to [R, l=1<\ohm>, *-*] (0, 0) % R3
    node[below left= 0.01cm]{A}(0, 0) -- (0, -2) to [I, l_=4<\ampere>](4, -2) -- (

    (4, 4) -- (3, 3) to [V, l = 4<\volt>] (1, 1) -- (0, 0) %V2
    ;

    \node (A) at (0,0){};
    \node (B) at (0,4){}
    edge [<-, thick, bend right, red] node [pos=0.5, left] {$U_{AB0}$} (A) ;

\end{circuitikz}
\vspace{-0.2cm}
\caption{Circuitul activ, in gol.}\label{fig: Thevenin}
\end{figure}
\vspace{-0.2cm}
```

```
\tab Am ales rezistorul dintre punctele A si B drept rezistor de sarcina.Mai intai
referinta al tensiunii de calculat (Fig. \ref{fig: Thevenin}), completam grafurile
\ref{fig: gdu2}), cu rationamente simple:

\vspace{-0.4cm}

\begin{minipage}{0.49\textwidth}
\begin{figure}[H]
\centering
\begin{circuitikz}[american]

    \draw(0, 0) to [short, i = 0<\ampere>, *-*] (4, 0);
    \draw(4, 0) to [short, i = 2<\ampere>](4, -4);
    \draw(4, -4) to [short, i = 6<\ampere>, *-*](0, -4);
    \draw(0, -4) -- (1, -3) to [short, i = 2<\ampere>] (3, -1) to (4, 0);
    \draw(0, -4) -- (0, -6) to [short, i = 4<\ampere>] (4, -6) to (4, -4);

\end{circuitikz}
\caption{Graful de curenti al circuitului activ, in gol.}\label{fig: gdc2}
\end{figure}
\end{minipage}
\begin{minipage}{0.49\textwidth}
\begin{figure}[H]
\centering
\begin{circuitikz}[american]
\tikzset{myptr/.style={decoration={markings, mark=at position 1 with {\arrow[scale
        postaction={decorate}}}

    \node (A) at (0,0){};
    \node (B) at (0,4){}
    edge [<-, thick, bend right, red] node [pos=0.5, left] {$U_{AB0}$} (A) ;
    \draw [myptr, *-*]node[above = 4cm]{B}(0, 4) -- (4, 4) node[midway, above] {\S
    \draw [myptr](4, 4) -- (4, 0) node[midway, right] {{\SI{-2}{\volt}}};
    \draw [myptr, *-*](4, 0) -- (0, 0) node[midway, above] {\SI{6}{\volt}};
    \draw [myptr](0, 0) --(4, 4) node[midway, left] {\SI{-4}{\volt}};
    \draw [myptr]node[left] {A}(0, 0) -- (0, -2) -- (4, -2) node[midway, above] {{

\end{circuitikz}
\caption{Graful de tensiuni al circuitului activ, in gol.}\label{fig: gdu2}
\end{figure}
\end{minipage}
\end{samepage}
\vspace{-0.4cm}
Reiese imediat din Fig.\ref{fig: gdu2} ca:

\vspace{-0.3cm}
\begin{equation} \label{eq: UAB0}
{U_{AB0}} = -4 - (-2) ={\SI{-2}{\V}},
\end{equation}

Calculul rezistentei circuitului pasivizat si in gol; Desenam acum schema circuitu

\begin{figure}[H]\centering
\begin{circuitikz}[american]

    \draw(0, 4) to [R, l = 1<\ohm>] (4, 4) % R2;
    (4, 4) to (4, 3) (4, 1) to (4, 0) % J1
    (4, 0)to [R, l=1<\ohm>] (0, 0) % R3
    %(0, 0) to [V, l_=1<\volt>](2, 0) % V3
    (0, 0) -- (0, -2) to (1, -2) (3, -2) to (4, -2) -- (4, 0) % J2
```

```
        (4, 4) -- (3, 3) to (1, 1) -- (0, 0) %V2
        ;

    \tikzset{myptr/.style={decoration={markings, mark=at position 1 with {\arrow[scale
            postaction={decorate}}}

    \draw[myptr, red](-0.5, 2) to node[midway, above] {$R_{AB0}$} (0.3, 2);
    \end{circuitikz}
    \caption{Circuitul pasiv, in gol.}\label{fig: circ_pasiv}
    \end{figure}

    Cum topologia circuitului este de tip serie-paralel, rezistenta echivalenta se obt
    \begin{equation} \label{eq: RAB0}
        {R_{AB0}} = {\SI{1}{\ohm}},
    \end{equation}

    Conform formulei Thévenin rezulta:

    \begin{equation} \label{eq: IAB}
        {I_{AB}} = \frac{U_{AB0}}{{R_{AB0}} + {R_{AB}}} = \frac{-2}{1+1} = {\SI{-1}{\a
    \end{equation}

    \begin{figure}[H]\centering
    \begin{circuitikz}[american]

        \draw (0, 0) to [R, l = 1<\ohm>](0, 2)
        (0, 2) to [V, l = 2<\volt>] (0, 4)
        (0, 4) -- (3, 4)
        (3, 4) to [R, l = 1<\ohm>] (3, 0)
        (3, 0) -- (0, 0);

    \end{circuitikz}
    \caption{Schema generatorului echivalent.}\label{fig: echivThev}
    \end{figure}

    \pagebreak

\begin{figure}[h!b]
\begin{center}
    %\hspace*{-1cm}
%   trim=100 75 100 100,clip,width=\textwidth
    \includegraphics[clip, width=\textwidth]{ELTH_GRAFICE}.
\end{center}
\vspace{-1.1cm}
\caption{Reprezentarea graficelor.}\label{fig:grafice}
\end{figure}

Observam in Fig. \ref{fig:grafice} marcat cu o steluta rosie punctul de coordonate (1,
valori: rezistenta initiala, valoarea puterii pentru rezistenta initiala, cat si perec
maxima si implicit valoarea acesteia.

Ne asteptam sa se intample acest lucru, dupa cum putem vedea si in Fig. \ref{fig:Valor
initiala si $R_{ab}$ cu rezistenta pentru care puterea este maxima, pentru ca stim ca
sarcina, $R_{AB}$ este egala cu rezistenta echivalenta a retelei pasivizate ($R_{AB0}$

\begin{figure}[h!b]
    \begin{center}
        \hspace*{-3cm}
        %   trim=100 75 100 100,clip,width=\textwidth
```

```
        \includegraphics[clip, width=180mm]{ValoriPutereRezistenta}.
    \end{center}
    \caption{Valori obtinute pentru Pmax si rezistenta asociata.}\label{fig:ValoriPR}
\end{figure}

\subsection{Punctul static de functionare pentru rezistorul liniar si generatorul echi
    \tab Am reprezentat pe acelasi grafic din Fig. \ref{fig:grafice} o steluta de culo
    functionare aflat la intersectia dreptei de sarcina (dreapta marcata cu mov) cu ca
    rezistorului $R_{AB}$(dreapta marcata cu verde), avand coordonatele (-1, -1).

\subsection{Punctul static de functionare pentru dioda semiconductoare si generatorul

    \tab Am ales $I_{S}$ de ordinul pA si $V_{T}$ de ordinul mV.
    Ca metoda numerica, am lucrat cu metoda bisectiei pentru ca este mai robusta si du
    \ref{fig:Depiu1} sau Fig. \ref{fig:Depiu2}, aveam posibilitatea ca in urma aplicar
    portiune unde aveam derivata 0, iar ca urmare algoritmul divergea.
    Vreau sa mentin aceeasi dreapta de sarcina in cazul celor doua grafice, unde dreap
    Liniile 14 atat din Fig. \ref{fig:ValDirecta}, cat si din Fig. \ref{fig:ValInversa
    caracteristici(a diodei sau a generatorului echivalent) in punctul r.
    \begin{equation} \label{eq:ecPolDir}
    i(u) = \frac{U_{ABO}}{R_{AB0}}-\frac{u}{R_{AB0}}
    \end{equation}

    Vom avea 2 cazuri:

    {\color{orange}{\bf Cazul 1}} (Polarizare directa):

    \begin{equation} \label{eq:ecPolDir}
    i(u) = I_{S}(e^{\frac{u}{V_{T}}}-1)
    \end{equation}


    \begin{figure}[H]
    \hspace{1.7cm}
    \includegraphics[trim = 20 0 23 70, clip, scale=0.6]{PolarizareDirecta}
    \caption{Dependenta i functie de u (polarizare directa).}\label{fig:Depiu1}
    \end{figure}

    Observam ca valoarea PSF se invarte in jurul valorii de (-2, 0), deci avem grija c
    Fig. \ref{fig: CodBisectie} sa contina pe "-2".

    \begin{figure}[H]
        \hspace{.6cm}
        \includegraphics[trim = 200 180 610 110, clip, scale=0.6]{PozaValPolDirecta}
        \caption{Valori obtinute in urma rularii codului pentru cazul de polarizare di
    \end{figure}
\vspace{-0.4cm}
Observam din Fig. \ref{fig:ValDirecta} ca in urma rularii codului, obtinem valorile la
\pagebreak

    {\color{orange}{\bf Cazul 2}} (Polarizare inversa):
    \begin{equation} \label{eq:ecPolDir}
    i(u) = I_{S}(1-e^{\frac{-u}{V_{T}}})
    \end{equation}
    \vspace{-0.6cm}
    \begin{figure}[H]
        \hspace{1.7cm}
        \includegraphics[trim = 20 0 23 70, clip, scale=0.6]{PolarizareInversa}
        \caption{Depende i functie de u (polarizare inversa).}\label{fig:Depiu2}
    \end{figure}
```

```
    \vspace{-0.3cm}
    Observam ca valoarea PSF se invarte in jurul valorii de (-0.7, -1), deci avem grij
    Fig. \ref{fig: CodBisectie} sa contina "-0.7".

    \begin{figure}[H]
    \hspace{.6cm}
    \includegraphics[trim = 200 180 610 110, clip, scale=0.6]{PozaValPolInversa}
    \caption{Valori obtinute in urma rularii codului pentru cazul de polarizare invers
\end{figure}

\vspace{-0.3cm}
Observam din Fig. \ref{fig:ValInversa} ca in urma rularii codului, obtinem valorile la

\pagebreak

    \section{Surse comandate}
    \vspace{-0.2cm}
    In cadrul acestei cerinte, am avut de generat doua circuite diferite, avand o SUCI
    Atasez netlistul figurilor \ref{fig:SIT_TO_SUCI} si \ref{fig: SIC_TO_SICU} in \ref
    \vspace{-0.4cm}
    \subsection{Transformare SIT in SUCI}

    \vspace{-0.8cm}
    \begin{figure}[H]
    \centering
    \begin{circuitikz}[american]

        \draw(0, 0) to [R, l = 1<\ohm>, *-*](0,4) % R1
        (2, 4) to [cV, l_ = $\frac{1}{3}I$, color=red, red] (0, 4) % V2
        (2, 4) to [R, l = 1<\ohm>] (4, 4) % R2
        (4, 4) to [I, l = 2<\ampere>, *-*] (4, 0) % J1
        (4, 0) -- (3, 0)
        (3, 0)to [R, l=1<\ohm>] (1, 0) % R3
        (1, 0) to [short, i = $I$,](0, 0)
        (0, 0) -- (0, -2) to [I, l_=4<\ampere>](4, -2) -- (4, 0) % J2

        (4, 4) -- (3, 3) to [V, l = 4<\volt>] (1, 1) -- (0, 0) %V2
        ;

    \end{circuitikz}
\vspace{-0.2cm}
    \caption{Circuit generat prin inlocuirea SIT cu SUCI.}\label{fig: SUCI}
    \vspace{-0.3cm}
    \begin{flushleft}
    \tab Coeficientul de ..... este egal cu .., iar din Fig. \ref{fig:SIT_TO_SUCI},
    tensiuni, reprezentate in Fig. \ref{fig: gdc}, respectiv Fig. \ref{fig: gdu}
    \end{flushleft}
    \vspace{0.1cm}
    \includegraphics[trim=100 75 100 100,clip,width=\textwidth]{SIT_TO_SUCI}.
    \end{figure}
    \begin{figure}[h!b]
    \begin{center}
    \end{center}
        \vspace{-1.1cm}
        \caption{Reprezentarea cirucitului din Fig. \ref{fig: SUCI} in LTspice.}\label
    \end{figure}

    \subsection{Transformare SIC in SICU}
    \vspace{-0.3cm}
```

```
    \begin{figure}[H]
    \centering
    \begin{circuitikz}[american]

        \draw node[above left= 0.01cm]{A}(0, 0) to [R, l = 1<\ohm>, *-*](0,4) % R1
        (2, 4) to [V, l_ = 2<\volt>] (0, 4) % V2
        (2, 4) to [R, l = 1<\ohm>] (4, 4)node[above right= 0.01cm]{C} % R2
        (4, 4) to [I, l = 2<\ampere>, *-*] (4, 0) % J1
        (4, 0)to [R, l=1<\ohm>] (0, 0) % R3
        %(0, 0) to [V, l_=1<\volt>](2, 0) % V3
        (0, 0) -- (0, -2) to [cI, l_=$1\cdot(V_{C} - V_{A})$, color=red, red](4, -2) -

        (4, 4) -- (3, 3) to [V, l = 4<\volt>] (1, 1) -- (0, 0) %V2
        ;

    \end{circuitikz}
    \caption{Circuit generat prin inlocuirea SIC cu SICU.}\label{fig: SICU}
    \end{figure}
    \begin{flushleft}
    \tab Coeficientul de ..... este egal cu .., iar din Fig. \ref{fig: SIC_TO_SICU},
    tensiune reprezentate in Fig. \ref{fig: gdc}, respectiv Fig. \ref{fig: gdu}.
    \end{flushleft}
    \begin{figure}[h!b]
    \begin{center}
    \includegraphics[trim=100 75 100 100,clip,width=\textwidth]{SIC_TO_SICU}
    \end{center}
    \caption{Reprezentarea cirucitului din Fig. \ref{fig: SICU} in LTspice.}\label{fig
    \end{figure}

    \pagebreak

    \subsection{Netlists}

    \begin{figure}[H]
    \begin{minipage}{0.5\textwidth}
    \includegraphics[scale=0.7]{NETLIST_SIT_TO_SUCI}
    \end{minipage}
    \begin{minipage}{0.5\textwidth}
    \includegraphics[scale=0.7]{NETLIST_SIC_TO_SICU}
    \end{minipage}
    \caption{Netlisturile pentru simularile din Fig. \ref{fig:SIT_TO_SUCI} (in stanga)
    \end{figure}
\pagebreak
\section{Redactare Latex}
\tab In redactarea temei, am folosit \LaTeX. Adaug mai jos cateva capturi de ecran ale

\pagebreak

\addcontentsline{toc}{section}{Bibliografie}
\begin{thebibliography}{99}
    \bibitem{bib:one_article}
    Gabriela Ciuprina, Daniel Ioan, Mihai Popescu, Sorin Lup, Ruxandra Barbulescu, Ele
    actualizat la 23 aprilie 2020.
    \bibitem{bib:one_article} Template latex v4
    \bibitem{bib:one_article}
    {\href{https://tex.stackexchange.com/questions/75116/what-can-i-use-to-typeset-mat
    om/questions/75116/what-can-i-use-to-typeset-matlab-code-in-my-document}}
        \bibitem{bib:one_article}
    {\href{https://tex.stackexchange.com/questions/122945/coloured-shadowed-boxes-arou
    uestions/122945/coloured-shadowed-boxes-around-equations/122952}}
```

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    {\href{https://tex.stackexchange.com/questions/122945/coloured-shadowed-boxes-arou
    uestions/122945/coloured-shadowed-boxes-around-equations/122952}}
        \bibitem{bib:one_article}
    {\href{https://tex.stackexchange.com/}{https://tex.stackexchange.com/}}
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    {\href{https://www.overleaf.com/}{https://www.overleaf.com/}}
\end{thebibliography}

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    \begin{appendix}
\section{Cod Matlab}
\label{sec:codMatlab}

Acesta este codul de matlab folosit in realizarea graficului din Fig. \ref{fig:grafice

\lstinputlisting{grafice.m}

\pagebreak
Cod matlab folosit in realizarea Fig. \ref{fig:Depiu1}:
\lstinputlisting{polarizareDirecta.m}
Cod matlab folosit in realizarea Fig. \ref{fig:Depiu2}:
\lstinputlisting{polarizareInversa.m}

\pagebreak

\section{Cod Octave}
\tab Acesta este codul pe care l-am folosit pentru a determina numeric punctul static
PSF1} si \ref{sssec: PSF2}
    \begin{figure}[H]
    \includegraphics[trim = 220 0 520 125, clip, scale=0.6]{CodBisectie}
    \caption{Codul folosit pentru metoda bisectiei.}
    \label{fig: CodBisectie}
    \end{figure}
\end{appendix}

\end{document}
```