1) (4 Points)
   a) For the circuit in Figure 1 calculate $V_{\text{Thevenin}}$ and $R_{\text{Thevenin}}$ between points A and B.

   b) Draw the Thevenin equivalent circuit of the circuit shown in Figure 1 and label $V_{\text{Thevenin}}$ and $R_{\text{Thevenin}}$ with the appropriate values.

![Figure 1](image1)

2) (3 Points)
   a) For the circuit in Figure 2 calculate $V_{AB} = V_A - V_B$.

   b) For the circuit in Figure 2 calculate $I_1$.

![Figure 2](image2)

3) (3 Points)
   a) For the circuit in Figure 3 calculate $V_{AB} = V_A - V_B$.

![Figure 3](image3)
4) (4 Points)
For the circuit in Figure 4 assume that
\( V_{in} = 2 \sin(2000 \pi t) \) Volts. Clearly draw and label
the output voltage \( V_{AB} \) (specify its amplitude(s)) as a
function of time for the following conditions:

a) Assume that \( V_{Diode\_On} = 0 \) V, i.e., no forward diode
voltage drop and unlimited forward bias current.
Draw the output for the circuit in Figure 4 at \( V_{AB} \) vs. \( t \)
over a 2 msec time interval.

b) Assume that \( V_{Diode\_On} = 0.7 \) V. Draw the output for the circuit in Figure 4 at \( V_{AB} \) vs. \( t \) over a 2 msec time interval.

5) (4 Points)
A square wave with frequency \( f_0 \) is applied to the circuit in Figure 5
at \( V_{in} \).

a) Draw the input and the corresponding output observed at \( V_{out} \)
over two periods of the square wave, when: \( f_0 \ll f_{3dB} \).

a) Draw the input and the corresponding output observed at \( V_{out} \)
over two periods of the square wave, when: \( f_0 \gg f_{3dB} \).

6) (4 Points)
Assume that the transistor in Figure 6 does not operate in
the saturated mode and that it has a \( h_{fe} = \beta = 100 \) and a
\( V_{Diode\_On} = 0.6 \) V. You may use appropriate
approximations, i.e., your results should be accurate to
within 5%.

a) For \( V_s \) very small, find the following DC voltages and
currents: \( V_B \), \( V_E \) and \( I_E \).

b) Using the information previously stated, calculate \( I_C \)
and \( I_B \).

c) Calculate the AC voltage gain of the circuit, i.e., find
\( V_{out\_AC} / V_s \) for \( V_s \) small.

7) (3 Points)
a) Find the transfer function for the circuit in Figure 7 in terms of
\( L \), \( R \) and \( C \).
You do not need to simplify your answer and you do not have to
calculate the modulus or absolute value of the function!