

This part carries only 30 marks out of 50 marks. Please upload the solutions to VTOP. The remaining part (VIVA) in lms.vit.ac.in will be conducted at 09:00PM tonight (06-Dec-2021).

Instructions:

Enter your name and registration number in every circuit and plot.

For the lab experiment,

- **Write the Aim.**
- **Complete the Software/Hardware components used.**
- **Obtain the expression for the outputs.**
- **Place the respective circuits in LT Spice.**
- **Connect the inputs and outputs. Name them and write the same in the lab copy(inputs and outputs section).**
- **Use probe in LT spice to plot all possible combinations.**
- **Write a concluding statement for each circuit.**

Questions:

1. Design and simulate low pass filter using RL circuit. Plot the ac analysis of voltage across the resistor and obtain the phase value in degrees where the amplitude of the output is -12dB.
2. Design and simulate low pass filter using RC circuit. Plot the ac analysis of voltage across the capacitor and obtain the phase value in degrees where the amplitude of the output is -12dB.
3. Design a buck converter and perform AC analysis. Plot the bode plot and obtain the angle of phase at which the output voltage in bode plot is -20dB.
4. This question has two parts. Answer both.
 - a) Obtain the input characteristics of transistor 2SC4102 in CE configuration, with $R_B=2k$ and $R_C=64K$.
 - b) In a new plot pane, plot the current through the resistor R_C along the same x-axis of the input characteristics. What is the value of saturation current(through R_C) when the source VCE is 12V. Note: Saturation current appears when the plot is constant for varying x axis.
5. With a input sinusoidal voltage of peak amplitude of 6V,
 - a) Design a clipper circuit with +ve clipper at 1.5V. Plot the output voltage.
 - b) Design a clipper circuit with -ve clipper at -3V. Plot the output voltage.
6. With a input sinusoidal voltage of peak amplitude of 6V,

Design a clamper circuit with positive peak output voltage of about 0.8V and negative peak of about -11.2V. Plot the output voltage. Note: Use 1N914 diode.

7. For an input sinusoidal voltage of 120V(peak), obtain a half wave rectified output voltage with a peak value of 59.6V. Obtain the turns ratio of the transformer to be used in the circuit. Note: Use 1N4148 diode.
8. For an input sinusoidal voltage of 120V(peak), obtain a full wave rectified output voltage with a peak value of 28.8V. Obtain the turns ratio of the transformer to be used in the circuit. Note: Use 1N4148 diodes.
9. Using BC547B, Design a CE amplifier of biasing resistors at base as $18k\Omega$ and $2k\Omega$. The resistor at the collector as $5k\Omega$ and emitter resistor as $1.5k\Omega$. The input and output coupling capacitors as $10\mu F$ and the bypass capacitor at emitter as $47\mu F$. The load resistor as $10k\Omega$.
Obtain the bode plot with ac analysis frequency sweep and find the start and stop frequencies of the bandwidth when output voltage value in dB is 60dB in the bode plot.
10. Implement
 - a) NAND gate and
 - b) AND gateusing CMOS by using NAND gate and inverter circuits. Use 130nm technology. plot the output waveforms separately.
11. Implement
 - a) NOR gate and
 - b) OR gateusing NMOS. Use NOR gate and inverter circuits. . plot the output waveforms separately.