

Analog Electronics

Experiment 3: Class B and class AB amplifier

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Slot: L33+L34

Aim:

To design and analyze the class B and class AB amplifier.

Class B amplifier

Design:

$$I_L = 9.0765/10$$

$$= 0.90765A$$

$$I_{dc} = 2 * I_L / \pi$$

$$= 0.57782A$$

$$P_{in} = V_{cc} \times I_{dc}$$

$$= 6.93384W$$

$$P_o = V_{out} \times I_L$$

$$= 4.1191W$$

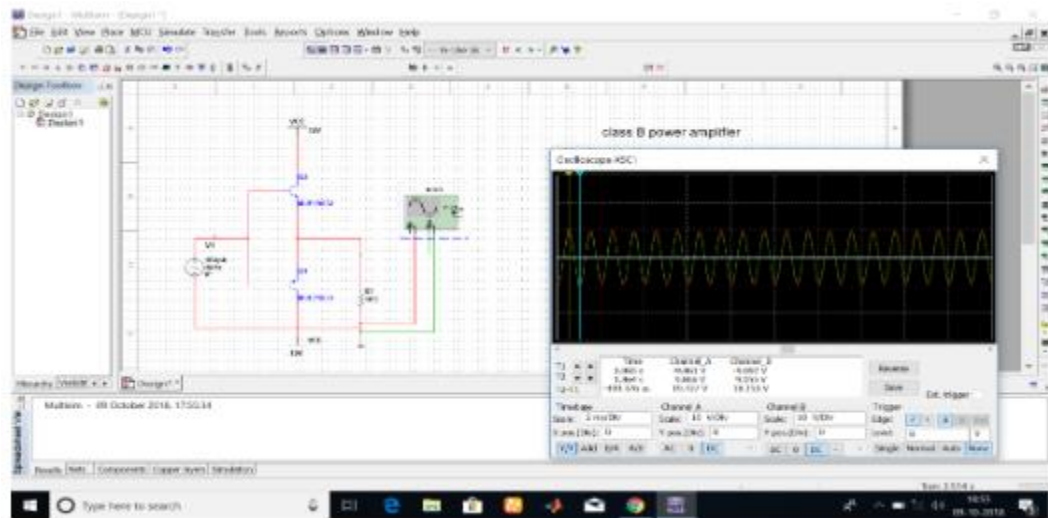
$$\eta(\text{efficiency}) = [P_o / P_{in}] \times 100$$

$$= 59.4\%$$

Power dissipated by each transistor:

$$P = (P_{in} - P_o) / 2;$$

$$= 1.40737W$$



Class AB amplifier

Design:

$$I_L = 9.838/10$$

$$= 0.9838A$$

$$I_{dc} = 2 \cdot I_L / \pi$$

$$= 0.62630A$$

$$P_{in} = V_{cc} \cdot I_{dc}$$

$$= 7.5156W$$

$$P_o = V_{out} \cdot I_L$$

$$= 4.839W$$

$$\eta(\text{efficiency}) = [P_o / P_{in}] \times 100$$

$$= 64.4\%$$

Power dissipated by each transistor:

$$P = (P_{in} - P_o) / 2;$$

= 1.3383W

The screenshot displays a Multisim simulation environment. On the left, a circuit diagram of a class AB power amplifier is shown. It features a push-pull output stage with two NPN BJTs (Q1, Q2) and two PNP BJTs (Q3, Q4). The circuit includes a 10V AC voltage source (V1), a 10kΩ resistor (R1), and a 10kΩ resistor (R2). The output is connected to a load resistor (RL) and a speaker icon. The circuit is powered by a 10V DC source (VCC). The output waveform is shown on the right, labeled 'class AB power amplifier'. The waveform is a sine wave with a peak-to-peak voltage of approximately 10V. The simulation results are displayed in the bottom right corner, showing the time base (2ms/div) and the scale (10 V/div). The output voltage is 10.000 V, and the output current is 1.3383 W.