

SIGNALS AND SYSTEMS - EE1205 LAB REPORT

AUDIO AMPLIFIER

By Nimal Gireekumar EE23BTECH11044

Aim:

To make an audio amplifier using LM386 (stereo).

Materials needed:

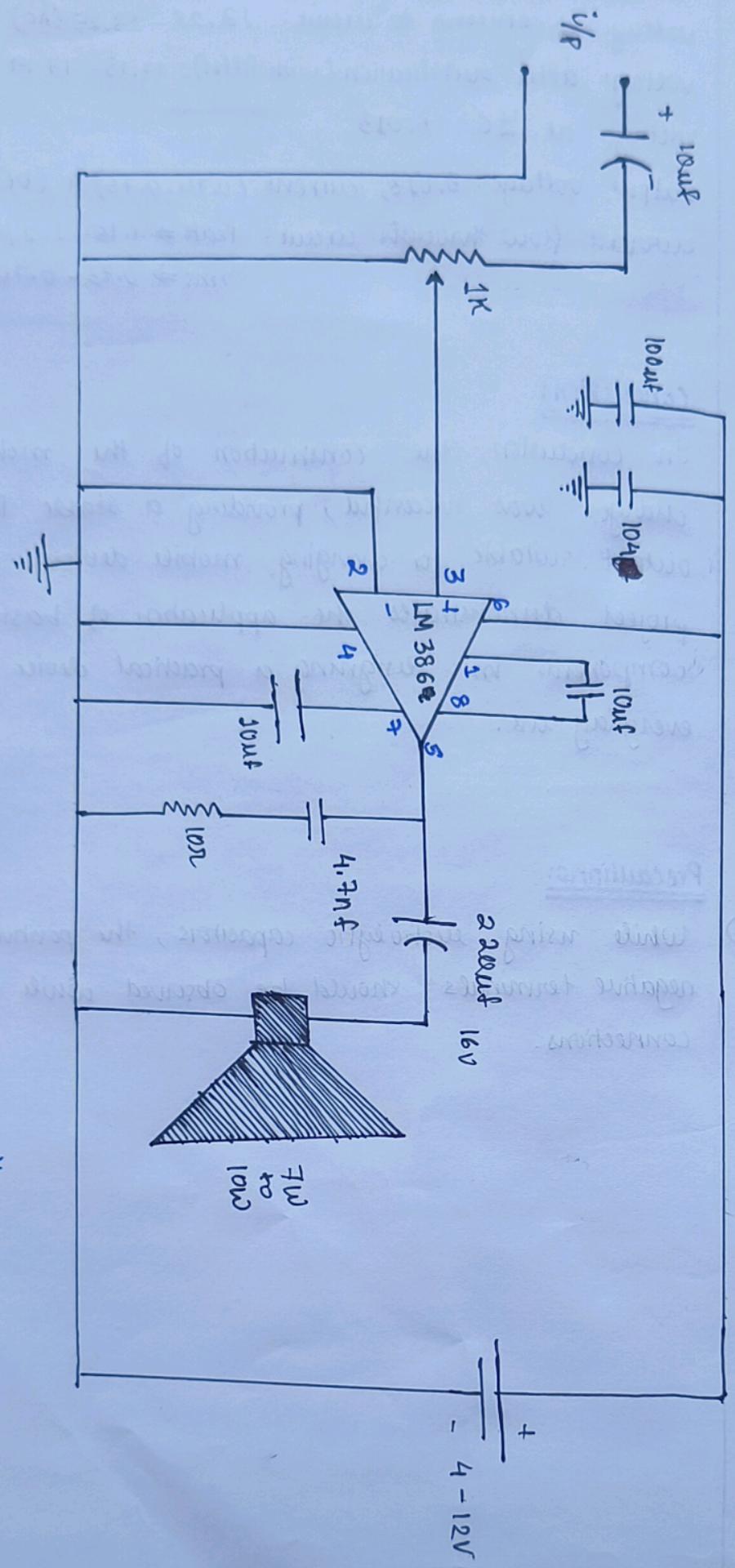
- (i) LM386
- (ii) Breadboard (1 or 2)
- (iii) speakers (x2)
- (iv) Audio Jack
- (v) Resistor (10Ω (x2))
- (vi) Capacitors ($10\mu F$ (x6), $100\mu F$ (x2), $220\mu F$ (x2), $4.7nF$ (x2), $104\mu F$ (x2))
- (vii) Rheostat (x2)
- (viii) Power supply. (4V-12V)

Working of circuit:

LM386: It is an IC or a low voltage audio power amplifier designed for use in various consumer applications. The LM386 internally amplifies the weak input signal by a factor of 20 (or up to 200 times with external components). The increased voltage level allows the signals to drive a speaker efficiently.

Input capacitor: This is often connected at the input of LM386 to block any DC voltages from the input source. It allows only AC audio signal to pass through.

Fig 1. audio amplifier (mono) circuit.



Gain control: In the LM386 circuit, gain can be controlled by gain control refers to adjusting the level of amplification provided by the LM386 chip. The chip has a default gain of 20, but there it can be increased by adding a capacitor (10μF) and a resistor in series between pins 1 and 8. (Look at Fig).

By pass capacitors: Placed between the pins 6 and 4 (virtually) which are also called as power supply pins, this capacitors help to filter out noise and stabilize voltage supply.

High-pass filter/ output capacitor: In the circuit it is the 220μF capacitor between pins 5 and speaker. It blocks any DC components from reaching the connected speaker. It also makes the sound more sharper.

Speaker: It converts the amplified electrical signal back to sound waves.

Procedure:

- 1) Start by placing the LM386 IC on the board, following the pinout diagram from fig. 1. Ensure proper orientation.
- 2) Install the resistors and capacitors according to the circuit diagram. Pay close attention to polarity for electrolytic capacitors (positive leg longer).
- 3) Connect the speaker to the designated output pin of LM386.

L M386:

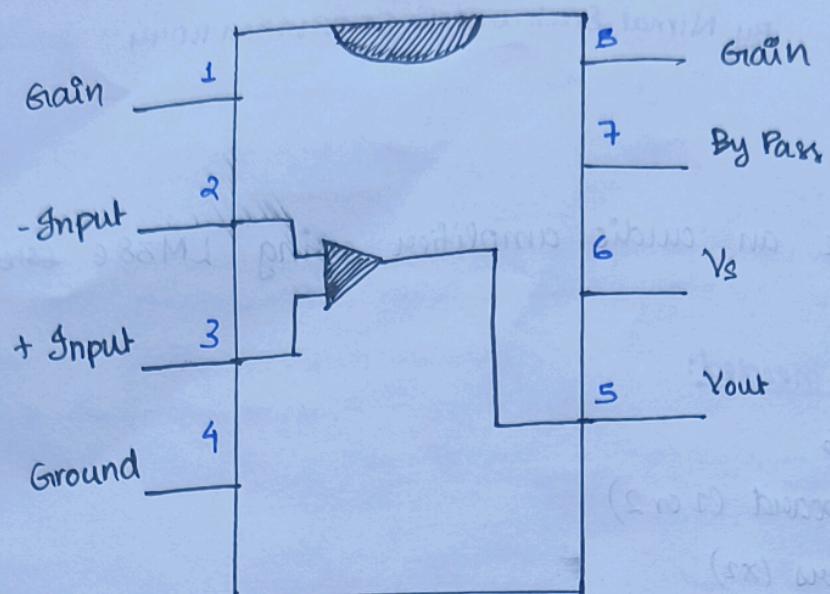


Fig 2.

- 4) Wire the audio input jack to the input section of the circuit, following the diagram. This might involve a capacitor for AC coupling.
- 5) Incorporate the potentiometer into the circuit if it's used for gain control. Typically, it connects between the input jack and the LM386.
- 6) Double-check all connections for accuracy and avoid shorts.
- 7) Connect the DC power supply to the designated power input pins of LM386, observing correct polarity.
- 8) Apply an audio signal to the input jack. You should hear amplified sound from the speakers if the circuit is functioning correctly.
- 9) Adjust the volume control (if present) to the desired level.
- 10) Enclose the circuit

Observation:

- (i) By changing value in the rheostat, we can reduce of the noise in the output.
- (ii) During playing music, the current through the circuit has various values according to frequency of the music.
- (iii) By changing the value of capacitor between pin 1 & pin 8, the loudness of the sound can be varied.

Conclusion:

The project successfully achieved its objectives by designing and constructing a reliable audio amplifier (stereo). It provides insight about impedance matching, capacitor selection etc.

Precautions:

- i) Ensure proper voltage and current ratings for your power supply and components.
- ii) Double-check connections before powering on the circuit.
- iii) Start with low volume levels when testing the circuit for the first time.