

ABHISHEK SHARMA.

CS THIRD YEAR.

SECTION - 'I'

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ANALOG ELECTRONICS CIRCUITS LAB.

DAY - 3.

ASSIGNMENT - 3.

(Experiment No. : 03)

Date : 13.08.2021.

University of Engineering and Management, Kolkata  
Department of Computer Science & Engineering.

Experiment No : 3.

Date : 13.08.2021.

Title :- To study the 1 stage and 2 stage RC coupled amplifier using the voltage characteristics.

Aim :- The aim of this experiment is to study the RC amplifiers both single stage and double stage coupled with the help of the voltage changes in the output probe/voltmeter as compared to the input voltage provided by the AC source.

Apparatus Required :-

- (i) AC power source - 10 mV, 1 kHz.
- (ii) DC power source - 12V
- (iii) Capacitors - 10  $\mu$ F. (5 pcs).
- (iv) Resistors. -
  - (a) 1 k $\Omega$
  - (b) 4 k $\Omega$
  - (c) 10 k $\Omega$ .
  - (d) 5 k $\Omega$
  - (e) 26 k $\Omega$
  - (f) 50 k $\Omega$
  - (g) 100 k $\Omega$ .
- (v) NPN Transistor. - 100 A/A.
- (vi) Ground
- (vii) voltmeter probe.
- (viii) Ammeter probe.

Theory :- Here we are discussing about two types of RC amplifiers, they are - single stage RC amplifier and 2 stage RC coupled amplifier. Firstly, single stage RC coupled amplifier.

(i) Single stage RC amplifier :- The single stage RC coupled amplifier consists of a transistor connected to the emitter configuration with necessary circuit components.

Biasing is done by a potential divider arrangement using the resistors those are connected along with capacitors and the power source. The voltage across the resistor is connected through the resistors and thereby forward biasing the base emitter junction.

Two stage RC coupled amplifier :- When an AC input signal is applied at the base of the first transistor, it gets amplified and appears at the collector load,  $R_L$  which is then passed through the coupling capacitor  $C_C$  to the next stage. This becomes the input of the next stage and whose amplified output again across the collector load. Thus the signal is amplified in stage by stage action.

The following are the advantages of RC coupled amplifier -

- (i) The frequency response of RC amplifier provides constant gain over a wide frequency range, hence most suitable for audio applications.
- (ii) The circuit is simple and has lower cost because it employs resistors and capacitors which are very cheap.
- (iii) It becomes more compact with the upgrading technology.

Applications :-

- (i) They have excellent audio fidelity over a wide range of frequency.
- (ii) Widely used as voltage amplifiers.
- (iii) Due to poor impedance matching, RC coupling is rarely used in the final stages.



### Disadvantages of RC coupled amplifier :-

- (i) The voltage and power gain are too low because of the effective load resistance.
- (ii) They become noisy with age.
- (iii) Due to poor impedance matching, power transfer will be low.

### PROCEDURE for this experiment :-

- (a) Open MultiSim Online live simulator in your browser and click on the new circuit to create the new circuit.
- (b) Place the apparatus as per circuit diagram shown in the figures and connect the apparatus with the connecting wires to make the complete connection.
- (c) After making the complete connection, add the voltmeters and ammeters from the probe section to take the reading of the input voltage ( $V_i$ ) and output voltage ( $V_o$ ) and additionally we can take the readings of the load current or, simply the output current ( $I_o$ ). These are the three parameters that are going to be added in the graph.
- (d) Using the grapher, check the graph using the  $V_i$ ,  $V_o$  and  $I_o$ , which shows the characteristics of the graph and the voltages of the RC coupled amplifier both 1 stage and 2-stage!

The circuit diagram and the graphical characteristics are shown here -

P.T.O.

### Single Stage RC coupled amplifier :-

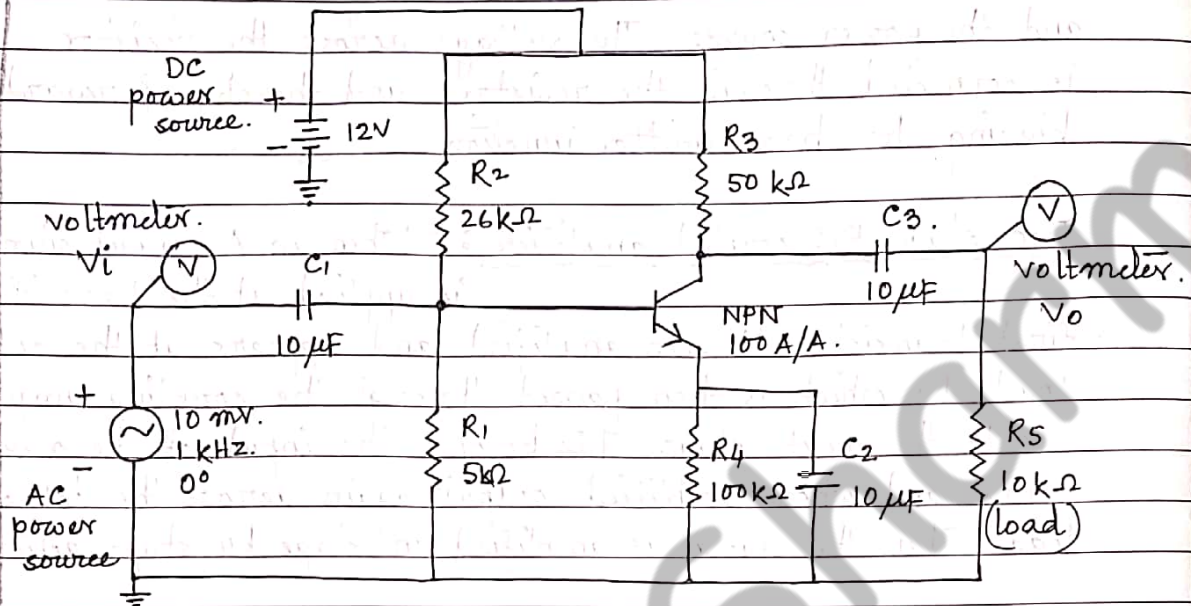


Fig : Circuit diagram of Single stage RC coupled amplifier

### Input voltage ( $V_i$ ) v/s Output voltage ( $V_o$ ) graph :-

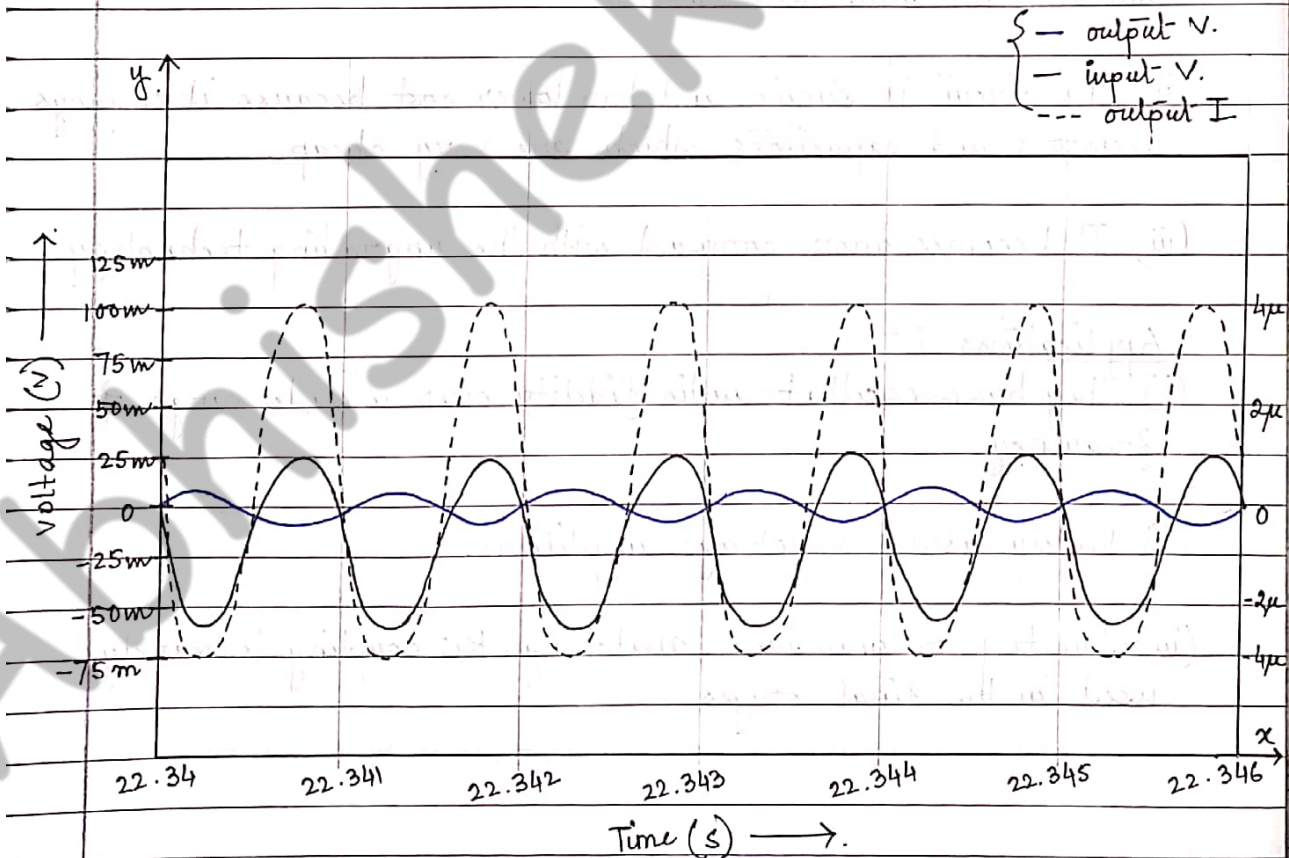


Fig : Voltage and current characteristics of 1 stage RC coupled amplifier



### ■ Double stage or, Two stage RC coupled amplifier :-

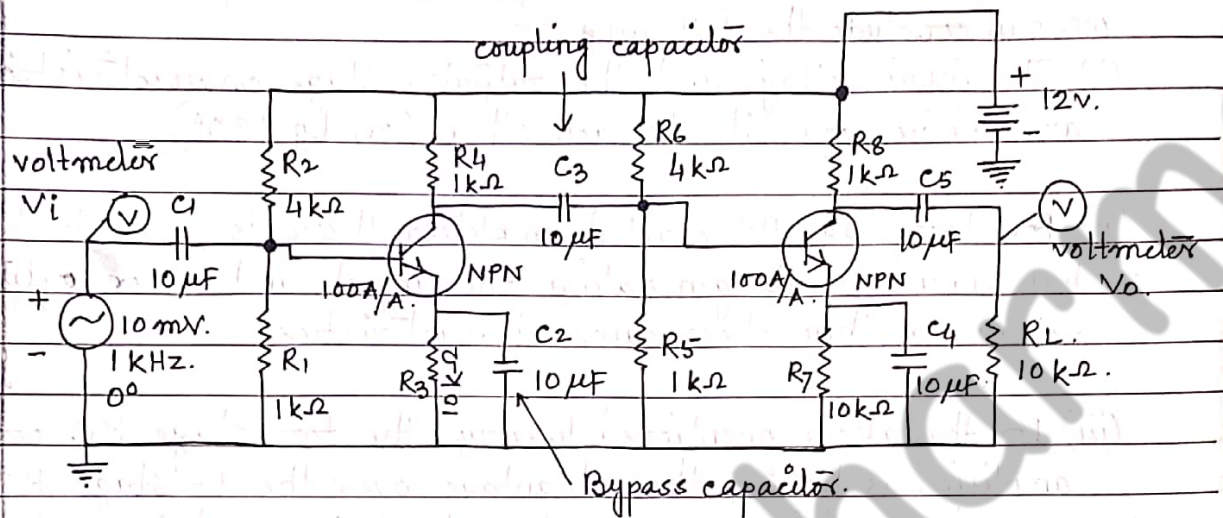


Fig :- Circuit Diagram of 2-Stage RC coupled amplifier.

### ■ Input voltage ( $V_i$ ) v/s. Output voltage ( $V_o$ ) graph :-

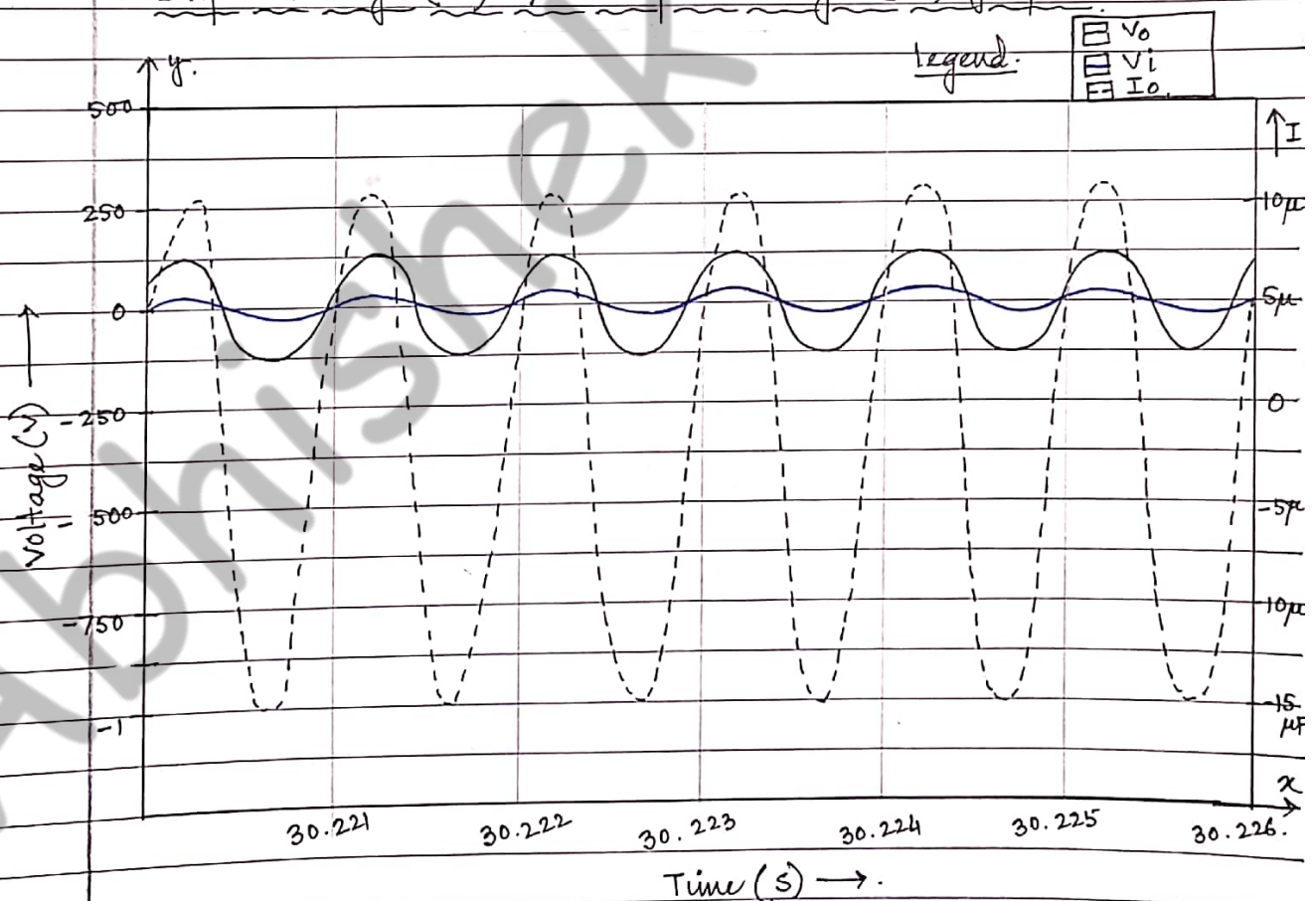


Fig :- Voltage and current characteristics for 2-stage RC coupled amplifier

Conclusion :- From both the graphical analysis coming from the two different types of RC coupled amplifier we can conclude the following—

- (i) The input voltage and the output voltage characteristics are mirror opposite to each other (or, by  $180^\circ$ ).
- (ii) For, two stage RC coupled amplifier there is no such things happening while generating the input and  $V_o$  or, output voltage as they show same characteristics.
- (iii) For the above mentioned luxury, the two stage RC coupled amplifier is having the advantage over the 1-stage RC coupled amplifier. and That's why being used in various electronics gadgets especially in the audio field.

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