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Introduction

The report for lab 6 i.e., Diodes took place on 17 March 2021.Appendix at the end is the prelab Assignment.

Objective

The main goal of this lab is to analyze the characteristics of the common emitter amplifier and learn the experimental procedures to observe the input and output impedance of an amplifier.

Circuit under Test

The circuit in figure 1 is a common emitter amplifier circuit. Vcc = 15V.

Diagram, schematic

Description automatically generated

Figure 1.

The circuit in figure 1 is a common Base amplifier which is using a 2N3904NPN BJT in active mode with the values of Rs= 50 Ωand Rl=10KΩ. with this we can calculate the input and output impedance.

Experimental Result

E1. Common Base amplifier uses 2N3904 BJT as the transistor and the tables are in printed in the prelab section.

E2. From the above step we continue by making the signal generator to produce 1 KHz sinusoidal wave with small Vs magnitude.

A picture containing text, black, displayed, several

Description automatically generated

Graph E2: waveforms of Vo and Vi.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| 8.26mV | 658mV | 79.43 | -40.618 | -1.48 | 38.27 |

Table E2(a). Input and output Ac voltages and gain of the common emitter amplifier with Rl=10kΩ.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
| 8.27mV | 1.316V | 171.9 | -40.642 | 4.97 | 45.26 |

Table E2(b). Input and output Ac voltages and gain of the common emitter amplifier with Rl=∞.

E3. In this step we calculate Ri, for this we attach a multimeter to observe the ac voltage.

Diagram, schematic

Description automatically generated

Ω\*

Ω

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | (KΩ) |
| 62.3 | 10.7 | 5.26 | 0.0602 |

Table E3. Parameters of common emitter amplifier for determining its input resistances.

E4. The amplifier replaces the wire to the input resistance with a short link which bring the amplifier to the step E2.

KΩ

|  |  |  |  |
| --- | --- | --- | --- |
|  | (no load) |  | (KΩ) |
| 3.9 | 1.407V | 715mV | 3.78 |

Table E4. Parameters of common emitter amplifier for determining its output resistances.

Conclusion Remark

C2.

= /=528mV/0.067mOhms= 0.0787 mA

/= 710mV/0.01162mOhms=0.061mA

/=0.776

\*=78.329\*0.776=60.8

Appendix: prelab-Assignment

P1.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Vb | Vc | Ve | Ib | Ic | Ie | Gm |
| 5.3 | 10.7 | 4.5 | 0.005 | 0.7 | 0.7 | 26 |

Table p1(a).

Known values.

R1= 12KV

R2=5.6KV

Re=3.9KV

Rc=4.7KV

Now, we can calculate the values of

= ()=55.42v

= =26\*4.7=122.2v

= = 4.7KOhms

==0.036kOhms

|  |  |  |  |
| --- | --- | --- | --- |
| (v) | Av(v) | Ri(KΩ) | Ro(KΩ) |
| 122.2 | 55.42 | 0.036 | 4.7 |

Table p1(b).

P2.

Chart, histogram

Description automatically generated

Graph: and t ( and is the red graph)

A picture containing scene, laser, dark

Description automatically generated

Graph: