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| **Course Name:** | **ECAD** | **Semester:** | **IV** |
| **Date of Performance:** | **01 / 02 / 2021** | **Batch No:** | **B2** |
| **Faculty Name:** | **Prof. Sonia Joshi** | **Roll No:** | **1912052** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **/25** |

**Experiment No: 4**

**Title: Frequency Response of Cascade Amplifier**

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| **Aim and Objective of the Experiment:** |
| * To study frequency response of two stages RC coupled amplifier * To calculate mid-band gain, lower cut off and higher cut-off frequency and bandwidth. |

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| **COs to be achieved:** |
| **CO2**:Understand the need of multistage amplifiers for strengthening the signal |

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| **Theory:** |
| FET’s have very high input impedance. This avoids **loading effect**. The gain of single stage FET is very small. The effect of cascading of FET- BJT leads to a high voltage gain for all amplifiers the gain factor is function of signal frequency. While doing AC analysis we consider that all the coupling and bypass capacitor acts as a short circuit and frequency & frequency is low enough. Practically we get three parts in the frequency response curve same as in the case of single stage amplifier.   1. LOW FREQUENCY REGION 2. MID FREQUENCY REGION 3. HIGH FREQUENCY REGION   **EFFECT OF CASCADING ON THE GAIN**  If amplifier has individual gain then total gain becomes  AT  = A1.A2………………….AN Where N= No of amplifiers cascaded  Lower cut off frequency of the cascaded chain of ‘N’ number of identical stages is equal to the lower cut off frequency fL of the 1st stage. |

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| **Circuit Diagram/ Block Diagram:** |
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| **Stepwise-Procedure:** |
| 1. Make the connections as per the Circuit diagram.  2. Apply the sinusoidal input signal to the circuit.  3 Observe transient response of the circuit  4. Apply AC signal at the input of the circuit  5. Observe the Frequency response of the circuit  6. Calculate maximum gain and lower cut off frequency, higher cut off frequency, bandwidth theoretically and practically. |

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| **Observation Table:** |
| |  |  |  |  | | --- | --- | --- | --- | | **Frequency (Hz)** | **Output Voltage (V)** | **Av=Vo/Vi** | **Av(db)=20log(Vo/Vi)** | | **50** | **-36.039937dB** | **23.960063dB** | **38.14103dB** | | **100** | **-26.308571dB** | **33.691429dB** | **39.230785dB** | | **1K** | **-8.2893587dB** | **51.710641dB** | **41.559158dB** | | **10K** | **-7.5109594dB** | **52.489041dB** | **41.645733dB** | | **20K** | **-7.5240382dB** | **52.475962dB** | **41.643798dB** | | **100K** | **-8.0914286dB** | **51.908571dB** | **41.56795dB** | | **200K** | **-9.5153052dB** | **50.484695dB** | **41.364561dB** | | **1M** | **-19.679644dB** | **40.320356dB** | **39.8227dB** | | **2M** | **-7.5303669dB** | **33.770091dB** | **38.744786dB** | | **10M** | **-47.999227dB** | **12.000773dB** | **35.950118dB** | |

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| **Calculation:** |
| **Calculations:**    **Design of multistage CS-CE amplifier;**    fL = Hz  fH = Hz  B.W.= fH - fL = KHz  **Graphs:**  1. Calculate mid-band gain.  2. Calculate lower cut off and higher cut-off frequency and bandwidth. |

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| **Waveform** |
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| **Post Lab Subjective/Objective type Questions:** |
| 1. A roll-off of 20 dB per decade is equivalent to a roll-off of \_\_\_\_\_\_\_\_ per octave.    * 1. 3db      2. 6db      3. 10db      4. 12db 2. An amplifier has a Rin = 1.2 kΩ. The coupling capacitor is 1µF. Determine the approximate lower cut off frequency.    * 1. 133 Hz      2. 1.33 KHz      3. 13.3 KHz      4. 133 KHz      1. Explain the difference between RC coupling over direct coupling in cascading?      1. In cascade amplifier why FET is preferred over BJT in the first stage? 2. How to select amplifier configuration for cascade connection? |

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| **Conclusion:** |
| In multistage amplifier, the input impedance of the second stage acts as a load on the first stage.  We studied frequency response of two stages RC coupled amplifier  And calculated mid-band gain, lower cut off and higher cut-off frequency and bandwidth. |

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| **Signature of faculty in-charge with Date:** |