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| **Course Name:** | **Analog Integrated Circuits and Applications** | **Semester:** | **VI** |
| **Date of Performance:** | **Jan 15, 2024** | **Batch No:** | **A2** |
| **Faculty Name:** | **Prof. Ashwini Kumar** | **Roll No:** | **16010221042** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **/25** |

**Experiment No: 2**   
**Title: To study Inverting and Non Inverting Amplifier**  **using Op-amp**

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| **Aim and Objective of the Experiment:** |
| To study Inverting and Non-Inverting Amplifier using op-amp 741 |

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| **COs to be achieved:** |
| **CO2:** Design circuits using op-amps as linear applications. |

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| **Theory:** |
| The op amp used is high performance monolithic one constructed using the fair child planar epitaxial process. It is intended for wide range of analog applications. High common mode voltage & absence of latch up tendencies make 741 ideal for use as a Voltage follower.  Important features are:  1. No frequency compensation required  2. No short circuit protection  3. Offset voltage nullifying capability  4. No latch up problem  5. Large common mode & differential gain |

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| **Circuit Diagram:** |
| A)Inverting Amplifier: |

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| B)Non- Inverting Amplifier: |

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| **Stepwise-Procedure:** |
| **A. Inverting and Non-inverting amplifier**  1) Connect the circuit for Inverting configuration.  2) Apply sine wave input of 1Vp-p, 1kHz and measure output voltage.  3) Draw the input and output waveforms Vs time.  4) Increase input voltage from zero to maximum such that output goes in to saturation. 5) Measure VOH and VOL and draw transfer characteristic.  6) Repeat steps 2 to 5 for Non Inverting Amplifier |

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| **Observation Table:** |

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| **A)Inverting amplifier:**   **For Vin sine wave 1kHz**   |  |  |  |  | | --- | --- | --- | --- | | **Sr. No.** | **Vin volts(p-p)** | **Vout volts(p-p)** | **Gain (Vo/Vin)** | | 1. | 1 | **10** | **10** | | 2. | 2 | **17.5** | **8.75** | | 3. | 1.5 | **14** | **9.3** |   Find out maximum peak to peak voltage (Vin) such that no clipping is observed. Increase input voltage to observe clipping and measure VOH and VOL  **B)Non-inverting amplifier:**   **For Vin sine wave 1kHz**   |  |  |  |  | | --- | --- | --- | --- | | **Sr. No.** | **Vin volts(p-p)** | **Vout volts(p-p)** | **Gain (Vo/Vin)** | | 1. | 1 | **10** | **10** | | 2. | 1.5 | **15** | **10** | | 3. | 2 | **17** | **8.2** | |

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| **Calculation:** |
| **Design:-**  𝑅𝐹𝑅3  𝑉𝑜𝑢𝑡= ((𝑅2∗𝑉𝑎) −(𝑅1∗𝑉𝑏 ))…………………………..(1) 1)To design Subtractor,   𝑅1 = 𝑅2 = 𝑅3 = 𝑅𝐹  So that equation 1 becomes   𝑉𝑜𝑢𝑡= (𝑉𝑎−𝑉𝑏)  Assume, 𝑅1 = 𝑅2 = 𝑅3 = 𝑅𝐹= 10𝐾Ω |

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| **Results:** |
| Inverting: |

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| Non-Inverting: |

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| **Post Lab Questions:** |

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| **1.**List all linear applications of op-amp.  Voltage follower (Unity gain amplifier)  Inverting amplifier  Non-inverting amplifier  Summing amplifier  Difference amplifier  Integrator  Differentiator  Instrumentation amplifier  Active filters  **2.**Design averaging circuit for four DC inputs.  **3.**Design Adder-Subtractor circuit using opamp.  𝑉𝑜𝑢𝑡= (𝑉3 + 𝑉4) −(𝑉1 + 𝑉2) |

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| **Conclusion:** |
| In conclusion, the experiment aimed at implementing inverting and non-inverting amplifiers using |

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| the IC 741 operational amplifier was successfully conducted. The key characteristics of operational amplifiers, such as high open-loop gain, differential inputs, and single-ended output, were demonstrated in both configurations |

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

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