EE 313: ANALOG ELECTRONICS (3-0-2: 4)

Operational Amplifier Fundamentals

Operational Amplifier, Basic Op-Amp Configuration, An Op-Amp With Negative Feedback, Voltage Series And Voltage Shunt Configurations, Difference Amplifiers, Instrumentation Amplifier, Specification Of An Op-Amp, Offset Voltages And Currents, CMRR, Slew Rate, PSRR, Frequency Response, GBW Product, Input Bias And Offset Currents, Error Caused By Ib and Ios Input Offset Voltage, Errors Caused By V„, Low Input Offset Voltage OpAmps, DC Error Model Of Different Circuit, Input Offset-Error Compensation.

General Linear Applications

Summing, Scaling And Averaging Amplifiers, Voltage To Current Converter With Floating And Grounded Load, Current To Voltage Converter, Integrator And Differentiator.

Active Filters and Oscillators

First Order Active Filters, Second-Order Active Filters, Multiple—Feedback Filters (Band Pass And Band Reject Filters), All Pass Filter, State Variable And Biquad Filter, Cascade Design Of Filters, Oscillators, Phase Shift And Wien Bridge Oscillators, Square, Triangular And Saw Tooth Wave Generators.

Non-linear Circuits

Schmitt Trigger, Voltage Comparator, Voltage Limiters And Window Detector, Clippers And Clampers, Peak Detector, Precision Rectifiers, Analog Switches.

Specialized IC Applications

The 555 Timer, Application of 555 Timer Circuit, Phase Locked Loops, ICL8038 Function Generator, Voltage Controlled Oscillator.

D-A and A-D Converters

Introduction, Analog And Digital Data Conversion, Specification Of D/A Converter, Basic D/A Conversion Techniques, Sample And Hold Circuit, Performance Specifications of ND Converters, Classification of AID Converter, Parallel Comparator, Counter Type ND, Successive approximation Conversion, Dual Slope AID And High Speed A/D Converters, Microprocessors Compatible ND Converters, ADC080X Series ND Converters.

Linear Power Supplies

Introduction, Three-Terminal Regulator (Fixed Regulator), Voltage Adjustment And Current Boosting Of Fixed Regulator, Merits And Drawbacks Of Linear Regulators.

Suggested list of Experiments:

1. Zero Crossing Detector.
2. Inverting And Non-Inverting Amplifier.
3. Summing, Scaling And Averaging.
4. Integrator And Differentiator.

5. Active Filters.
6. Oscillator.
7. Application of Timer IC 555.
8. Voltage Regulator.

Simulate Above Experiments on Multisim Circuit Simulation Software.

Text Books

1. Sedra and Smith, "Microelectronic Circuits", Oxford University Press.
2. Gayakwad Ramakant, "Op-Amps And Linear Integrated Circuits", PHI.

References

1. Sergio Franco, "Design With Operational Amplifiers And Analog Integrated Circuits", McGraw- Hill.
2. Coughlin and Driscol, "Op-Amps And Linear Integrated Circuits", PHI.
3. Gray and Meyer, "Analysis And Design Of Analog Integrated Circuits"; John Wiley & Sons.
4. Salivahanan S., "Linear Integrated Circuits", McGraw-Hill.