Content Product
Detailed syllabus
LINEAR INTEGRATED CIRCUITS AND APPLICATIONS

UNIT I - IC FABRICATION

Introduction to ICs - Introduction to integrated circuits, Classification of ICs, Advantages and disadvantages of ICs. **Fundamentals of monolithic IC technology** - Fundamentals of monolithic IC technology. **Basic planar process** - Basic planar process, Silicon wafer preparation, Epitaxial growth, Oxidation, Photolithography, Diffusion, Ion implantation, Isolation techniques, Metallization, Assembly processing and packaging. F**abrication of a typical circuit** - **Fabrication of active and passive components of ICs** - Fabrication of monolithic diodes, Fabrication of integrated resistors, Fabrication of integrated capacitors. Fabrication of FET - FET fabrication, MOSFET fabrication, Complementary MOSFET (CMOS) fabrication.

UNIT II - CHARACTERISTICS OF OP-AMP

Operational amplifier- Introduction to operational amplifier, Circuit symbol and packages, OP-AMP terminals, Power supply connections. **Ideal operational amplifier** - The ideal operational amplifier. **Examples of IC op-am**ps - Motorola MC1530 op-amp, 741 op-amp. **FET operational amplifier** - FET differential Amplifier, JFET op-amps, MOSFET op-amps. **DC characteristics** - DC characteristics of op-amp, Input bias current, Input offset current, Input offset voltage, Total Output Offset Voltage, Thermal drift. **AC characteristics** - Frequency response, Stability of an op-amp, Analysis of stability function, Need of frequency compensation, External frequency compensation, Internal frequency compensation, Slew rate. **Differential Amplifier** - Differential Amplifier, Transfer Characteristic, Low Frequency Small Signal Analysis of Differential Amplifier, Differential mode gain, Common-mode gain, Circuits for improving CMRR, Improved current source circuits, Input resistance, Active Load, Level translator, Output stage. **Analysis of data sheets of an op-amp** - Analysis of data sheet of an op-amp, Electrical parameters in data sheet. **Inverting amplifier and voltage follower** - Inverting amplifier, Circuit diagram of inverting amplifier, Input and output resistance of inverting amplifier, Circuit diagram and operation of voltage follower, Advantages and applications of voltage follower. **Non-inverting amplifier** - Circuit diagram of non - inverting amplifier, Input and output resistance of non-inverting amplifier. **I-V and V-I convert**er - Current to voltage converter, Voltage to current converter, Application of I-V and V-I converter. **Summing and Difference amplifier** - Summing amplifier, Difference amplifier. I**ntegrator and Differentiator –** Integrator, Input and output waveforms of integrator, Differentiator, Input and output waveforms of differentiator.

UNIT III - APPLICATIONS OF OP-AMP

Instrumentation amplifier- Requirements of instrumentation amplifier, Block diagram of instrumentation amplifier, Circuit diagram of instrumentation amplifier. **Log and antilog amplifiers** - Log amplifier, Antilog amplifier. **Active filters** - RC active filters, First order active filters, second order active filters. **Comparator** - Introduction to comparator, Non inverting comparator, inverting comparator. **Astable multivibrator using Op-Amp** - Astable multivibrator using op-amp. **Monostable multivibrator using Op-Amp** - Monostable multivibrator using op-amp, Applications of monostable multivibrator. **Square wave generator** - Square wave generator, Operation of square wave generator.

Triangular wave generator - Triangular wave generator, Operation of triangular wave generator. **Sawtooth wave generator** - Sawtooth wave generator. **Clipper circuits** - Clipper circuits, Positive clipper circuits, Negative clipper circuits. **Clamper circuits** - Clamper circuits, Positive clamper circuit, Negative clamper circuit, Applications of clamper. **Peak detector** - Active peak detectors, Voltage follower peak detector, Peak detector using integrator. **Sample and hold circuit** - Sample and hold circuit. **A/D and D/A converter** - Need for A/D converters, Definition of A/D and D/A converters. **Principle and specifications of DACs** - Basic principle of DAC, Specifications of D/A converter. **Digital to analog converters** - R-2R ladder DAC, Binary Weighted resistor DAC. Disadvantages of weighted resistor DAC. **Analog to digital converter**s - A-D converters, Flash A/D converter, Counter type A/D converter, Servo tracking A/D converter, Successive approximation A/D converter, Dual Slope A/D converter.

UNIT IV - SPECIAL ICS

IC 555 Timer- Introduction of IC 555 Timer, Functional block diagram of IC 555 Timer. **Astable multivibrator using IC 555** - Astable multivibrator using IC 555. **Monostable multivibrator using IC555** - Monostable multivibrator using IC555. **Voltage Controlled Oscillator (VCO)** - Voltage Controlled Oscillator (VCO), Voltage Controlled Oscillator IC 566, Typical connection diagram of 566 VCO, Derivation of voltage to frequency conversion factor, Applications of VCO. **Phase Locked Loop (PLL)** - Introduction to phase locked loop, Block diagram of PLL, Phase detector or comparator block of PLL, Switched type phase detector, Digital phase detector, Close loop analysis of PLL, Transfer characteristics of PLL. **Monolithic phase locked loop IC 565** - Monolithic phase locked loop IC 565, Electrical parameters of 565 PLL, Derivation of lock range, Derivation of capture range, Filters used in PLL. **Applications of PLL** - Applications of PLL, Phase sensitive detection, FM demodulation and AM detection. **Frequency multiplier using PLL** - Introduction of Frequency multiplier, Working of frequency multiplier, Introduction of FM demodulator, FM demodulator using LM565C. **Analog multiplier** - Analog voltage multiplier circuit, Analog voltage divider circuit. **Multiplier integrated circuit** - Basic multiplier and its characteristics, Performance parameters of multiplier. **Applications of multiplier** - Applications of multiplier, Voltage divider using multiplier, Squaring and square rooting circuits using multiplier, Frequency doubler using multiplier, Phase angle detection using Multiplier, RMS detector and rectifier using multiplier. **Analog multiplier IC AD 533** - Introduction to multiplier IC AD 533, AD 533 as multiplier and divider, AD 533 as squarer and square rooter. **Analog multiplier IC AD 534** - Introduction to analog multiplier IC AD 534, Features and applications of AD 534, AD 534 as divide, AD 534 as square rooter.

UNIT V -APPLICATION ICs

IC voltage regulators- Introduction to IC voltage regulator, Block schematic of Regulated Power Supply (RPS), Factors affecting the load voltage, Power supply performance parameters. **Types of voltage regulators** - Types of voltage regulators, Advantages of IC voltage regulators. **Protection circuit in regulators** - Protection circuit in regulators, Constant current limiting circuit, Fold back current limiting circuit. **LM78XX, 79XX Fixed voltage regulators**- Three Terminal Fixed Voltage Regulators, Block Diagram of Basic Three Terminal IC Regulator, Data Sheet Specifications of IC Linear Regulators, IC Series of Three Terminal Fixed Voltage Regulators, Typical Connection of IC 7805 Regulator, Positive 5

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V Power Supply using IC 7805, Adjustable Regulator using 78XX Series, Applications of IC 78XX and 79XX, Datasheet Specifications of IC 780, Boosting Regulator Output Current. **Three terminal adjustable regulator** - Three terminal adjustable regulator, Connection diagram of LM 317 regulator, Solved problems based on voltage regulator. **General Purpose Linear IC 723 Regulator** - General Purpose Linear IC 723 Regulator, Important Features of IC 723, Internal Structure of IC 723, Specifications of IC Regulator 723, Applications of IC 723. **Switching Regulator** - Basic switching regulator, Block diagram of Switched Mode Power Supply (SMPS). **Types of switching regulators** - Types of switching regulators, Step up switching regulator (Boost), Step down switching regulator (Buck). **Power amplifier** - Features of large signal amplifier, Classification of large signal amplifiers, Class A power amplifiers, Class B power amplifiers, Class C power amplifier, Class AB power amplifier, Class D power amplifier. **LM 380 Power Audio Amplifier** - LM 380 Power Audio Amplifier, Features of LM 380 Audio Amplifier, Pin Diagram of LM 380, Internal Circuit Diagram of LM 380, Absolute Maximum Ratings of LM 380, Electrical characteristics of LM 380. **Applications of LM 380 audio amplifier**- LM 380 as audio power amplifier, LM 380 as high gain audio amplifier, LM 380 with a variable gain, Bridge configuration using LM 380, Phono amplifier using LM 380, Intercom system using LM 380, Siren/Alarm using LM 380 power amplifier. **ICL 8038 Function Generator** - ICL 8038 Function Generator, Basic principle, Circuit Diagram, Frequency of Output Waveform, Pin Configuration of ICL 803, Typical Connection.