

VL5012 SELECTED TOPICS IN IC DESIGN

DETAILED SYLLBUS

OBJECTIVES:

- This course deals with the supply circuit modules which are crucial modules in an IC design. Clock generation circuits play a major role in High Speed Broad Band Communication circuits, High Speed I/O's, Memory modules and Data Conversion Circuits.
- This course focuses on the design aspect of Clock Generation circuits and their design constraints.

UNIT I VOLTAGE AND CURRENT REFERENCES

Current Mirrors, Self Biased Current Reference, startup circuits, VBE based Current Reference, VT Based Current Reference, Band Gap Reference, Supply Independent Biasing, Temperature Independent Biasing, PTAT Current Generation, Constant Gm Biasing

UNIT II LOW DROP OUT REGULATORS

Analog Building Blocks, Negative Feedback, AC Design, Noise and Noise Reduction Techniques, Stability, LDO Efficiency, LDO Current Source, LDO Current Source Using Opamp.

UNIT III OSCILLATOR FUNDAMENTALS

General considerations, Ring oscillators, LC oscillators, Colpitts Oscillator, Jitter and Phase noise in Ring Oscillators, Impulse Sensitivity Function for Ring Oscillators, Phase Noise in Differential LC Oscillators.

UNIT IV PHASE LOCK LOOPS

PLL Fundamental, PLL stability, Noise Performance, Charge-Pump PLL Topology, CPPLL Building blocks, Jitter and Phase Noise performance.

UNIT V CLOCK AND DATA RECOVERY

CDR Architectures, Tias and Limiters, CMOS Interface, Linear Half Rate CMOS CDR Circuits, Wide capture Range CDR Circuits.

REFERENCES:

1. BehzadRazavi, "Design of Integrated circuits for Optical Communications", McGraw Hill, 2003.
2. Floyd M. Gardner, "Phase Lock Techniques" John wiley& Sons, Inc 2005.
3. Gabriel.A. Rincon-Mora, "Voltage references from diode to precision higher order band gap circuits", Johnwiley& Sons, Inc 2002.
4. High Speed Clock and Data Recovery, High-performance Amplifiers Power Management "
5. springer, 2008.