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CU5073 VLSI FOR WIRELESS COMMUNICATION

DETAILED SYLLABUS

UNIT I COMMUNICATION CONCEPTS

Introduction – Overview of Wireless systems – Standards – Access Methods – Modulation schemes – Classical channel – Wireless channel description – Path loss – Multipath fading – Standard Translation.

UNIT II RECEIVER ARCHITECTURE & LOW NOISE AMPLIFIERS

Receiver front end – Filter design – Non-idealities – Design parameters – Noise figure & Input intercept point. LNA Introduction – Wideband LNA design – Narrow band LNA design: Impedance matching & Core amplifier.

UNIT III MIXERS

Balancing Mixer - Qualitative Description of the Gilbert Mixer - Conversion Gain – Distortion – Noise - A Complete Active Mixer. Switching Mixer – Distortion, Conversion Gain & Noise in Unbalanced Switching Mixer - A Practical Unbalanced Switching Mixer. Sampling Mixer - Conversion Gain, Distortion, Intrinsic & Extrinsic Noise in Single Ended Sampling Mixer.

UNIT IV FREQUENCY SYNTHESIZERS

PLL – Phase detector – Dividers – Voltage Controlled Oscillators – LC oscillators – Ring Oscillators – Phase noise – Loop filters & design approaches – A complete synthesizer design example (DECT) – Frequency synthesizer with fractional divider.

UNIT V TRANSMITTER ARCHITECTURES & POWER AMPLIFIERS

Transmitter back end design – Quadrature LO generator – Power amplifier design.

REFERENCES:

- Bosco H Leung “VLSI for Wireless Communication”, Pearson Education, 2002.
- B.Razavi ,”RF Microelectronics” , Prentice-Hall ,1998.
- Behzad Razavi, “Design of Analog CMOS Integrated Circuits” McGraw-Hill, 1999.

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- Emad N Farag and Mohamed I Elmasry, "Mixed Signal VLSI wireless design – Circuits & Systems", Kluwer Academic Publishers, 2000.
- J. Crols and M. Steyaert, "CMOS Wireless Transceiver Design," Boston, Kluwer Academic Pub., 1997.
- Thomas H.Lee, "The Design of CMOS Radio – Frequency Integrated Circuits", Cambridge University Press ,2003.

OBJECTIVES:

- To understand the concepts of basic wireless communication concepts.
- To study the parameters in receiver and low noise amplifier design.
- To study the various types of mixers designed for wireless communication.
- To study and design PLL and VCO.
- To understand the concepts of transmitters and power amplifiers in wireless communication.