

KL University
Department of Electronics & Computer Engineering
M.Tech (wcn) First Semester 2015-2017

Course Code : 15-EM51F3
Course Title : RF System Design for Wireless Communications
Course Structure : 3-0-0
Credits : 3

SYLLABUS:

Unit 1: Fundamentals of System Design

Linear Systems and Transformations:- Linear System, Fourier Series and Transformation, Frequency Response of LTI Systems, Band-Pass to Low-Pass Equivalent Mapping and Hilbert Transform –

Nonlinear System Representation and Analysis Approaches:- Representation of Memoryless Nonlinear Systems, Multiple Input Effects in Nonlinear System, Memoryless Band-Pass Nonlinearities and Their Low-Pass Equivalents.

Unit 2: Radio Architectures and Design Considerations

Super heterodyne Architecture: - Configuration of Superheterodyne Radio, Frequency Planning, Design Consideration of Superheterodyne Transceiver.

Direct Conversion (Zero IF) Architecture: - Configuration of Direct-Conversion Radio.

Low IF Architecture: - Configuration of Low IF Radio, Approaches to Achieve High Image Rejection, Some Design Considerations.

Unit 3: Receiver System Analysis and Design

Introduction - **Sensitivity and Noise Figure of Receiver:** -Sensitivity Calculation, Cascaded Noise Figure. **Adjacent/Alternate Channel Selectivity and Blocking Characteristics:** – Desired Signal Level and Allowed Degradation, Formula of AdjacedAlternate Channel Selectivity and Blocking Characteristics, Two-Tone Blocking and AM Suppression Characteristics.

Receiver Dynamic Range and AGC System: -Dynamic Range of a Receiver. **System Design and Performance Evaluation:-** Receiver System Design Basics, Basic Requirements of Key Devices in Receiver System.

Unit 4: Transmitter System Analysis and Design

Introduction - Transmission Power and Spectrum - **Adjacent and Alternate Channel Power:** - Low-Pass Equivalent Behavioral Model Approach, Multitone Techniques.

Unit 5: Noise

Noise and Random Process: - Noise Power and Spectral Representation, Noise and Random Process Through Linear Systems, Narrow-Band Noise Representation, Noise Figure and Noise Temperature. **Noise Emission Calculation:** - Formulas for Noise-Emission Calculation, Some Important Notes in Noise-Emission Calculation, Noise Expressed in Voltage, Examples of Noise-Emission Calculations

Text Books:

1. Gu, Qizheng, “RF System Design of Transceivers for Wireless Communications,” 1st ed. Corr. 2nd printing, 2005, XIV, 479 p. 125 illus., Hardcover, Springer, ISBN: 978-0-387-24161

Reference Books:

1. D.K.Misra, “Radio Frequency and Microwave Communication Circuits, Analysis and Design”, John wiley & Sons., inc, 2004, kundli.
2. Pozar,D.M, “Microwave Engineering,” Adison Wesley, 3rd Edition, 1990.