

EC6017 RF SYSTEM DESIGN

DETAILED SYLLABUS

OBJECTIVES:

The student should be made to:

- Be familiar with RF transceiver system design for wireless communications.
- Be exposed to design methods of receivers and transmitters used in communication systems

UNIT I CMOS PHYSICS, TRANSCIVER SPECIFICATIONS AND ARCHITECTURES

Introduction to MOSFET Physics, Noise: Thermal, shot, flicker, popcorn noise, Two port Noise theory, Noise Figure, THD, IP2, IP3, Sensitivity, SFDR, Phase noise - Specification distribution over a communication link, Homodyne Receiver, Heterodyne Receiver, Image reject, Low IF Receiver Architectures Direct up conversion Transmitter, Two step up conversion Transmitter

UNIT II IMPEDANCE MATCHING AND AMPLIFIERS

S-parameters with Smith chart, Passive IC components, Impedance matching networks, Common Gate, Common Source Amplifiers, OC Time constants in bandwidth estimation and enhancement, High frequency amplifier design, Power match and Noise match, Single ended and Differential LNAs, Terminated with Resistors and Source Degeneration LNAs.

UNIT III FEEDBACK SYSTEMS AND POWER AMPLIFIERS

Stability of feedback systems: Gain and phase margin, Root-locus techniques, Time and Frequency domain considerations, Compensation, General model – Class A, AB, B, C, D, E and F amplifiers, Power amplifier Linearization Techniques, Efficiency boosting techniques, ACPR metric, Design considerations

UNIT IV PLL AND FREQUENCY SYNTHESIZERS

Linearised Model, Noise properties, Phase detectors, Loop filters and Charge pumps, Integer-N frequency synthesizers, Direct Digital Frequency synthesizers

UNIT V MIXERS AND OSCILLATORS

Mixer characteristics, Non-linear based mixers, Quadratic mixers, Multiplier based mixers, Single balanced and double balanced mixers, sub sampling mixers, Oscillators describing Functions, Colpitts oscillators, Resonators, Tuned Oscillators, Negative resistance oscillators, Phase noise.

TEXT BOOKS:

1. Thomas Lee, "The Design of Radio Frequency CMOS Integrated Circuits", Cambridge University Press, 2nd Edition, Cambridge, 2004.

REFERENCES:

1. Matthew M. Radmanesh, "Radio frequency and Microwave Electronics illustrated", Pearson Education Inc, Delhi, 2006.

Diploma, Anna Univ UG & PG Courses

Notes

Syllabus

Question Papers

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Available @

www.AllAbtEngg.com

2. B. Razavi, "RF Microelectronics", Pearson Education, 1997.
3. Devendra. K. Misra," Radio Frequency and Microwave communication Circuits – Analysis and Design", John Wiley and Sons, Newyork,2004.
4. B. Razavi, "Design of Analog COMS Integrated Circuits", Mc Graw Hill, 2001.