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**FIRST SEMESTER 2022-2023**

# Course Handout Part II

Date: 30-07-2022

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

*Course No.* : EEE G510

## Course Title : RF Microelectronics

## Instructor-in-Charge : Sourav Nandi

**1. Course Description:**

Introduction; application of RF electronics in modern systems; basic concepts in RF circuit design, active RF components:various RF diodes and transistors and their circuit models, matching and biasing networks, RF amplifier design: lowpower, low noise and broadband amplifiers, RF oscillator design; negative resistance oscillator; dielectric resonator oscillators,phase noise. RF Mixers: Balanced mixers; low noise mixers; noise in RF circuits, microwave transmitters and receivers.

**2. Scope and objective of the course:**

Objective of the course is to provide basic understanding of and skills to analyze and design CMOS RF integrated circuits. It will address all the relevant aspects of implementingvarious RF circuits in CMOS technology, which are used in communication applications including LNA, mixer, PLL, Power amplifier, oscillator and frequency synthesizers.

**3. Text Book:**BehzadRazavi, RF Microelectronics, Pearson India Education Services, 2nd edition, 2012.

**4. Reference Books:** Thomas H. Lee, The Design of CMOS Radio-Frequency Integrated Circuits, Cambridge University Press, 2nd edition, 2004.

**Course Plan:**

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| --- | --- | --- | --- |
| **Lecture No.** | **Learning objectives** | **Topics to be covered** | **Chapter in the Text Book** |
| 1 | Introduction to the course | Course handout discussion |  |
| 2-8 | In-depth understanding of all the generic issues pertaining to the performance of RF circuits | Basic Concepts in RF Design | Chapter-2 (T.B) |
| 9-15 | Understanding of various RF transceiver architectures and their relative benefits. | Transceiver Architectures | Chapter-4 (T.B) |
| 16-24 | Understanding of various LNA topologies and their relative performance | Low-Noise Amplifiers | Chapter-5 (T.B) |
| 25-30 | Understanding of various mixer topologies and their relative performances | Mixers | Chapter-6 (T.B) |
| 31-34 | Basic understanding of CMOS RF oscillators | Oscillators | Chapter-8 (T.B) |
| 35-38 | Basic understanding of PLLs in CMOS | Phase-Locked Loops | Chapter-9 (T.B) |
| 39- 40 | Basic understanding of CMOS freq. synthesizers | Freq. Synthesizers | Chapter-10 (T.B) |
| 41-42 | Basic understanding of CMOS RF power amplifiers | RF power amplifiers | Chapter-12 (T.B) |

**Evaluation Scheme:**

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| --- | --- | --- | --- | --- | --- |
| **Component** | **Duration** | **Weightage (%)** | **Marks** | **Date & Time** | **Nature of Component** |
| Literature Survey, Design, Lab Presentations | - | 30% | 60 |  | Open Book |
| Assignment |  | 10% | 20 |  | Open Book |
| Quizzes | - | 10% | 30 | To be announced in the class | Closed Book |
| Midterm test | 90 mins | 20% | 30 | 03/11 11.00 - 12.30PM | Closed Book |
| Comprehensive exam | 180 mins | 30% | 60 | 24/12 AN | Closed Book |

**Chamber Consultation Hour:**To be announced in the class.

Notices:Notices concerning this course will be on CMS.

**Make-up Policy:**Make-up will be given only to genuine cases. Prior applications must be sent for seeking the same. For quizzes and assignments, make-up will not be permitted.

**Academic Honesty and Integrity Policy:**Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Sourav Nandi**

**INSTRUCTOR-IN-CHARGE**