ANALOG ELECTRONIC CIRCUITS

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PRE-REQUISITES : Electrical technology and, Semiconductor Devices

INTENDED AUDIENCE : B.E/B.Tech,B.Sc in Electrical and Electronics discipline

INDUSTRIES APPLICABLE TO : Semiconductor companies such as, Intel, TI, Analog Devices, NXP, ST-microelectronics, Infineon

COURSE OUTLINE :
This course on Analog Electronic Circuits has been designed primarily as a core course for undergraduate students and, as a refresher course for master level students and circuit designers working in industry. It starts with basic circuit components and circuit concepts and then, gradually moves to practical building blocks of analog electronic systems. In this course, a serious attempt has been made to make a balance between theory and practice so that the discussed circuits can be constructed in an undergraduate level laboratory class and their measured performance can be easily compared with the analytically predicted performance.

ABOUT INSTRUCTOR :
Prof. Pradip Mandal is a professor in the Electronics and Electrical Communication Engineering Department of IIT Kharagpur. He received his PhD degree from Indian Institute of Science, Bangalore in 1999. He has more than seven years of hands-on design experience from three different IC design companies.

COURSE PLAN :

Week 1**:** Introduction of this course; Objective of the course

Week 2: Revisiting BJT - operation and characteristic equations. Revisiting MOSFET

Week 3: Analysis of simple non-linear circuits and introducing the notion of signal amplification

Week 4: Amplifier models (equivalent circuits): voltage amplifier, current amplifier

Week 5: Frequency response of CE and CS amplifiers

Week 6: Common Collector (CC) and Common Drain (CD) amplifiers– biasing, operation

Week 7: Multi transistor Amplifiers (operation and analysis): CE-CC; CS-CD; CC-CC; Darlington pair

Week 8: Single-ended signaling vs. differential signaling, Differential amplifier

Week 9: Current mirror- operation and analysis, Use of current mirror as bias circuit in amplifiers

Week 10: Feedback system: Basic feedback theory; Four different feedback configurations

Week 11: Oscillation in feedback system and oscillation criterion, Stability analysis of a feedback system

Week 12: Oscillator: Phase-shift and LC based sinusoidal oscillators. Comparator