**Lecture plan**

**EC 1442: Analog Design (ECE Department, NIT Silchar)**

**Pre-requisite: Analog Electronics, VLSI**

**1. Course Assessment Policies:**

(a) Mid Semester Examination: 30%

(b) End Semester Examination: 50%

(c) Class Test, Assignments, Quiz/Viva: 10%

(d) Minor Test10%

**2. Contents mapping to CO.**

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| Lect. Sl no | **Contents to be covered** | CO |
| 1, 2,3 | Introduction of Analog Design, Usefulness of the subject, Differential amplifiers: Single ended | C3,C4 |
| 4,5,6 | Differential operation, Basic Differential Pair, Common mode response | C3,C4 |
| 7,8,9 | Differential pair with MOS loads | C2,C3 |
| 10,11,12 | Passive and active current mirrors: Basic Current mirrors, Cascode current mirrors | C2,C3 |
| 13,14,15 | Active current mirrors | C1,C2,C3,C4 |
| 16,17,18 | Operational amplifiers: General considerations, One stage op-amp, Two stage Op-amp | C1,C2,C3,C4 |
| 19,20,21 | Gain boosting Common mode Feedback, Input range limitations | C3 |
| 22,23, | Slew rate , Power supply rejection ratio, Noise in op-amp | C1,C2,C3 |
| 24,25,26 | Noise: Statistical Characteristics of Noise , Types of noise, Representation of noise in circuits | C1,C2,C3 |
| 27,28,29 | , Noise in single stage amplifiers, Noise in differential Pairs Stability and frequency Compensation, Multipole systems, Phase and Gain margin | C1,C2,C3,C4 |
| 30,31,32 | Frequency compensation of two stage Op-Amp, Compensation techniques | C1,C2 |
| 33,34,35 | Wave generators and wave shaping: Sinusoidal Oscillator, Phase shift Oscillator, Wein Bridge Oscillator, Square and Triangular wave generator, Voltage time base generator | C1,C2 |
| 36,37, | Step generator, Modulation of square wave | C1,C2 |
| 38,39 | Filters: Active RC filters, Butterworth and Chebyshev filter function | C1,C2C4 |
| 40,41 | Switched capacitor Filter | C1,C2C4 |

Books: Design of Analog CMOS Integrated Circuits : B Razavi, TMH

Analysis & Design of Analog CMOS Integrated Circuits: Gray, Wiley

CMOS Analog Circuit Design : Allen and Holberg, Oxford. Univ. Press

Analog IC Design<: John & Martin , Wiley