# ELECTRONIC DEVICES AND AMPLIFIER CIRCUITS LAB

| Course Code | 20EC3351 | Year | II | Semester | I |
|---|---|---|---|---|---|
| Course Category | Program Core | Branch | ECE | Course Type | Lab |
| Credits | 1.5 | L-T-P | 0-0-3 | Prerequisites | Nil |
| Continuous Internal Evaluation | 15 | Semester End Evaluation | 35 | Total Marks | 50 |

| Course Outcomes | |
|---|---|
| Upon successful completion of the course, the student will be able to | |
| **CO1** | **Analyze** the devices BJT and MOSFET to model their small signal behavior. (L4) |
| **CO2** | **Apply** the network analysis techniques to find the parameters of BJT and MOSFET based amplifiers. (L3) |
| **CO3** | **Analyze** NMOS differential amplifiers for gain, input common mode range, power dissipation and CMRR. (L4) |
| **CO4** | **Evaluate** the performance of NMOS Current Mirror and to develop PCB Layout for Astable Multivibrator.(L5) |
| **CO5** | Make an effective report based on experiments |

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | | 3 | | | | | | | 3 | | | | 3 | |
| **CO2** | 3 | | | | | | | | 3 | | | | 3 | |
| **CO3** | | 2 | | | | | | | 2 | | | | 2 | |
| **CO4** | | | 2 | | | | | | 2 | | | | 2 | |
| **CO5** | | | | | | | | | | 3 | | | | |
| Average* (Rounded to nearest integer) | 3 | 3 | 2 | | | | | | 3 | 3 | | | 3 | |

## Syllabus

| Any Ten Experiments (H/W or Simulation) | | |
|---|---|---|
| **Expt. No.** | **Contents** | **Mapped CO** |
| 1 | Voltage-Current Characteristics of BJT / Measurement of scale current & common emitter current gain | **CO1, CO5** |
| 2 | Measurement of small signal parameters ($g_m$, $r_o$, $r_\pi$, $r_e$) of BJT at a given operating (Q) point. | **CO1 CO5,** |
| 3 | Implement BJT amplifier and Inverter logic gate | **CO2, CO5** |
| 4 | Voltage-Current Characteristics of MOSFET / Measurement of threshold voltage | **CO1, CO5** |
| 5 | Measurement of small signal parameters ($g_m$, ro, $g_{mb}$) of MOSFET at a given operating point | **CO1, CO5** |

| | | |
|---|---|---|
| 6 | Analyze Common Source Amplifier for Gain, Power dissipation requirements | **CO2, CO5** |
| 7 | Design and Simulation of Common Drain Amplifier (Voltage Buffer) for Gain, Output Impedance, Level Shift requirements | **CO2, CO5** |
| 8 | Analyze the necessary parameters for Basic NMOS Differential Pair | **CO3, CO5** |
| 9 | Design and Simulation of Differential Amplifier with active current mirror load for gain, power dissipation CMRR requirements. | **CO3, CO5** |
| 10 | Analyze the basic NMOS current mirror and current steering circuit | **CO4, CO5** |
| 11 | Simulate the PCB fabrication of a BJT Multivibrator Circuit | **CO4, CO5** |

**Learning Resources**

**Text Books**

1. Adel S. Sedra, Kenneth C. Smith, Arun N. Chandorkar, Microelectronic Circuits, 6/e, Oxford University Press, 2013

**Reference Books**

1. Behzad Razavi, Fundamentals of Microelectronics, 2/e, Wiley Student Edition, 2013.
2. R.L.Boylestad, Louis Nashelsky, Electronic Devices and Circuits Theory, 10/e, Pearson, 2009.
3. Dharma Raj Cheruku, B T Krishna, Electronic Devices and Circuits, 2/e, Pearson, 2008.

**e- Resources & other digital material**

1. https://www.researchgate.net/publication/314154179_Electronics_Lab_Manual
2. http://abexp.aiaiai.dk/electronic_devices_and_circuits_lab_manual_bgpltd.pdf