| Semester | III | Course Title | Analog Electronics | Course Code | 18 EC 32 |
|---|---|---|---|---|---|
| Teaching Period | 50 Hours | L – T – P – TL* | 3 – 1 – 0 – 4 | Credits | 4 |
| CIE* | 40 Marks | SEE* | 60 Marks | Total | 100 Marks |

**CREDITS – 04**

**Course objectives:** This course will enable students to:

- Explain various BJT parameters, connections and configurations.
- Explain BJT Amplifier, Hybrid Equivalent and Hybrid Models.
- Explain construction and characteristics of JFETs and MOSFETs.
- Explain various types of FET biasing, and demonstrate the use of FET amplifiers.
- Construct frequency response of BJT and FET amplifiers at various frequencies.
- Analyze Power amplifier circuits in different modes of operation.
- Construct Feedback and Oscillator circuits using FET.

## Module -1

**BJT Biasing:** Operating point, fixed bias circuits, voltage divider bias(exact analysis and approximate) With related equations and problems.

**BJT AC Analysis:** BJT Transistor Modeling, The re transistor model, Common emitter fixed bias, Voltage divider bias, Emitter follower configuration .The Hybrid equivalent model, Approximate Hybrid Equivalent Circuit- Fixed bias, Voltage divider, Emitter follower configuration, Hybrid $\pi$ Model.

**L1, L2,L3**

## Module -2

**FET Frequency Response**: Logarithms, Decibels Low frequency response-FET Amplifier, Miller effect capacitance, High frequency response-FET Amplifier, Multistage Frequency Effects.

**FET Amplifiers:** JFET small signal model, Fixed bias configuration, Self bias configuration, Voltage divider configuration, Common Gate configuration. Source- Follower Configuration, Cascade configuration.

**L1, L2, L3**

## Module -3

**MOSFETs: Biasing in MOS amplifier circuits:** Fixing VGS, Fixing VG, and Drain to Gate feedback resistor. Small signal operation and modeling: The DC bias point, signal current in drain, voltage gain, small signal equivalent circuit models, trans conductance.

**MOSFET internal capacitances and High frequency model:** The gate capacitive effect, Junction capacitances, High frequency model.

**MOSFET Amplifier configuration:** Basic configurations, characterizing amplifiers, CS amplifier with and without source resistance RS, Source follower. MOSFET internal capacitances and High frequency model: The gate capacitive effect, Junction capacitances, High frequency model **L1, L2, L3**

## Module -4

**Feedback and Oscillator Circuits:** Feedback concepts, Feedback connection types, Practical feedback circuits, Oscillator operation, FET Phase shift oscillator, Wien bridge oscillator, Tuned Oscillator circuit, Crystal oscillator, UJT construction, UJT Oscillator. **L1,L2, L3**

**Module -5**

**Power Amplifiers:** Definition and amplifier types, Series fed class A amplifier, Transformer coupled class A amplifier, Class B amplifier operation and circuits, Amplifier distortion, Class C and Class D amplifiers.

**Voltage Regulators:** Discrete transistor voltage regulation - Series and Shunt Voltage regulators. **L1, L2, L3**

**Course Outcomes:** After studying this course, students will be able to:

- **Acquire** knowledge of working principles, characteristics and frequency response of BJT and FET single stage, cascaded and feedback amplifier configurations.
- **Explain** the principle and characteristics of feedback, oscillator circuits and power amplifier.
- **Construct** transistorized circuits, amplifiers and oscillators.
- **Analyze** the FET amplifier of various configurations, power amplifiers and oscillator Circuits.
- **Evaluate** the performance of BJT, FET and power amplifier circuits.

**Text Book:**


- Robert L. Boylestad and Louis Nashelsky, ―Electronics devices and Circuit theory‖, Pearson, 10th/11th Edition, 2012, ISBN:978-81-317-6459-6.


**Reference Books:**


- Adel S. Sedra and Kenneth C. Smith, ―Micro Electronic Circuits Theory and Application‖, 5th Edition ISBN:0198062257
- Fundamentals of Microelectronics, Behzad Razavi, John Weily ISBN 2013 978-81- 265-2307-8
- J.Millman & C.C.Halkias―Integrated Electronics, 2nd edition, 2010, TMH. ISBN 0- 07-462245-5
- K. A. Navas, ―Electronics Lab Manual‖, Volume I, PHI, 5th Edition, 2015, ISBN:9788120351424.