

Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ING229-B	Analogical Electronics	3	2	2	2	4	7

Prerequisites

Admission Requirements

Language of Instruction French

Course Type Compulsory

Course Level Bachelor Degree

Objective

- 1. Review: Electric Circuits: Direct Current (DC) Circuits
  - Current, current density, and resistance (Ohm's Law)
  - Electromotive force (emf) and voltage
  - Kirchhoff's Laws (Junction and Loop rules)
  - Thevenin and Norton theorems
- 2. Transient Response
  - First and second-order circuits (RC, RL, and RLC)
  - Charge/discharge curves and time constant concept
  - Step and pulse responses of circuits
- 3. Alternating Current and Sinusoidal Steady-State
  - Complex numbers and phasor concept
  - Impedance and admittance
  - AC Power (Active, reactive, apparent power, and power factor)
  - Series and parallel resonance in RLC circuits
- 4. Frequency Response and Filters
  - Transfer function concept
  - Bode plots (Drawing and reading magnitude and phase curves)
  - Passive filter topologies: Low-pass, high-pass, band-pass, and band-stop filters
  - Cutoff frequency and bandwidth calculations
- 5. Fundamentals of Semiconductor Physics
  - Energy band structures of conductors, insulators, and semiconductors
  - Intrinsic semiconductors and electron-hole concept
  - P-type and N-type doping
  - P-N junction and depletion region formation
- 6. Diodes and Applications
  - Ideal and real diode characteristics (Current-Voltage, I-V curve)
  - Rectifier circuits: Half-wave and full-wave (bridge) rectifiers
  - Ripple voltage reduction with filter capacitor
  - Zener diodes and voltage regulation
  - Clipper, clamper circuits, and LEDs
- 7. Transistors
  - Bipolar Junction Transistors (BJT): NPN and PNP structures
  - BJT operating regions (Cutoff, Saturation, Active region)
  - BJT biasing circuits and DC load line
  - Transistor logic as a switch and amplifier
  - Introduction to Field Effect Transistors (FET/MOSFET)
- 8. Operational Amplifiers (Op-Amps)
  - Ideal Op-Amp characteristics and equivalent circuit
  - Negative feedback principle and virtual short circuit
  - Basic Op-Amp configurations: Inverting and non-inverting amplifiers
  - Adder, subtractor, and voltage follower (buffer) circuits
  - Integrator and differentiator circuits (Electronic equivalent of mathematical operations)

Content

References

Theory Topics

Week

Weekly Contents