

Department Core Course-4 (DCC)
EC207- ANALOG ELECTRONICS-I

Details of course: -

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Analog Electronics – I	3	0	2	Basic Knowledge of semiconductor physics

Course objective:

To develop an understanding of the physical mechanisms of semiconductors that govern the operation of diodes, BJTs, MOSFETs and to use this information to analyze and design circuits. Lab exercises are also significant components of the course.

Course Outcomes:

- EC201.1 Explain the principles of operation of semiconductor devices such as diode, BJT and MOSFET.
- EC201.2 Determine parameter values for large and small signal models for diodes, BJTs and MOSFETs based on knowledge of the device structure, dimensions, and bias conditions.
- EC201.3 Determine, compare, and contrast the performance parameters of single stage amplifier circuits using BJTs and MOSFETs
- EC201.4 Identify the high frequency limitations of BJTs and MOSFETs and determine the performance of multistage amplifiers.
- EC201.5 Analyze and design analog electronic circuits using discrete components.
- EC201.6 Design, construct and take measurement of various analog circuits and compare experimental results in the laboratory with theoretical analysis

S. No.	Content	Contact Hours
Unit 1	Review of semiconductor physics, p-n Junction diode: Physical operation, I-V characteristic and diode equation, Large-signal model, Concept of load line, p-n junction capacitances (depletion and diffusion), small signal (low and high frequency) model, Breakdown in p-n diodes, Zener diode.	8
Unit 2	Diode Applications: Rectifier circuits, Zener diode based voltage regulators, limiting and clamping circuits, voltage multipliers, switching behavior of p-n diode, SPICE model of p-n diode, an example of p-n diode data sheet.	6
Unit 3	Bipolar Junction Transistor(BJT): Physical structure and modes of operation, BJT current components, The Ebers-Moll model, BJT characteristics, and large-signal equivalent circuit, BJT Biasing for Discrete-Circuit Design, BJT small-signal equivalent, Basic single stage BJT amplifier configurations, BJT as a switch, SPICE BJT model and simulation examples.	11
Unit 4	Metal oxide semiconductor Field Effect Transistors MOSFET: Physical structure and V-I characteristics of Enhancement/Depletion- type MOSFETs	11

	(n/p-channel), Biasing in MOS amplifier circuits, Small signal equivalent circuit of MOSFET, Basic configurations of single stage MOS amplifier circuits, MOSFET as an analog switch, SPICE MOSFET models and simulation examples.	
Unit 5	Multistage Amplifiers: Analysis of multistage amplifier using BJT and MOSFETs, Significance of coupling and bypass capacitor, types of coupling: DC, RC and Transformer BJT and MOS based constant current sources	6
	Total	42

Books: -

S. No	Name of Books/Authors/Publisher
1	Microelectronics circuits by Sedra and Smith; Oxford university press, 5 th edition
2	Fundamentals of Microelectronics circuits by B. Razavi, 3 rd edition
3	Microelectronics by Millman and Grabel; Tata McGraw Hill, 2 nd edition
4	Electronic Devices and Circuits by B Kumar and Shail Bala Jain, PHI, 2 nd edition
5	Microelectronics circuits by Rashid, PWS Publishing Company, 2000, 2 nd edition
6	Electronic Devices and circuit theory by Robert L. Boylestad, Louis Nashelska Pearson, 9 th edition