

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE MODULE

Faculty Name: Dr. Bhagyashree S R & Mr. Guruprasad K N			Academic Year: 2026-27 (Odd Sem)				
Department: Electronics and Communication Engineering							
Course Code	Course Title	Core/ Elective	Prerequisite	Contact Hours			Total Hours/ Sessions
				L	T	P	
1BEC304	Analog Electronics and Linear Integrated Circuits	Core (PCC)	Fundamentals of Semiconductor Devices, Knowledge of Circuit Analysis, Basic Electronic Components	3	-	-	42 (8 Hours / Module)
Course objectives: This course will enable students to: 1. To introduce the working principles and fundamental characteristics of semiconductor devices such as BJTs, MOSFETs, and operational amplifiers. 2. To develop the ability to analyze basic amplifier circuits using BJTs, MOSFETs, and operational amplifiers. 3. To impart knowledge of the fundamental concepts and operation of oscillators and timer circuits. 4. To develop skills in designing basic electronic filters and power amplifier circuits. 5. To familiarize students with linear operational amplifiers and their applications in electronic circuits.							
Topics Covered as per Syllabus							
Module-1 BJT AC Models: Base Biased Amplifier, Emitter Biased Amplifier, Small Signal Operation, AC Beta, AC Resistance of the Emitter Diode, Two Transistor Models, Analyzing Amplifier. Voltage Amplifiers: Voltage Gain, Multistage Amplifiers. CC And CB Amplifiers: CC Amplifier, Output Impedance, Cascading CE And CC, Darlington Connections, Voltage Regulation, The Common Base Amplifier. Text book 1: 8.1-8.7, 8.9, 9.1, 9.3-9.8							
Module-2 MOSFET Biasing in MOS Amplifier Circuits: Fixing VGS, Fixing VG, Drain to Gate Feedback Resistor. Small Signal Operation and Modelling: The DC Bias Point, Signal Current in Drain, Voltage Gain, Small Signal Equivalent Circuit Models, Transconductance, The T Equivalent Circuit Model. MOSFET Amplifier Configuration: Basic Configurations, Characterizing Amplifiers, CS Amplifier with And Without Source Resistance, The Common Gate Amplifier, Source Follower. Text book 2: 7.2, 7.2.1, 7.3, 7.3.1 - 7.3.6, 7.4, 7.4.1							
Module-3 Negative Feedback: Four Types of Negative Feedback, VCVS Voltage Gain, Other VCVS Equations, ICVS Amplifier, VCIS Amplifier, ICIS Amplifier (No Mathematical Derivation). Oscillator: Theory of Sinusoidal Oscillation, The Wein-Bridge Oscillator, RC Phase Shift Oscillator, The Colpitts Oscillator, Hartley Oscillator, Crystal Oscillator. The 555 Timer: Monostable Operation, Astable Operation. Text book 1: 17.1-17.6, 21.1-21.8							
Module-4 Power Amplifiers: Amplifier Terms, Two Load Lines, Class A Operation, Class B Operation, Class B Push Pull Emitter Follower, Class C Operation. Active Filters: Ideal Responses, First Order Stages, VCVS Unity Gain Second Order Low Pass Filters, VCVS Equal Component Low Pass Filters, VCVS High Pass Filters, MFB Bandpass Filters, Bandstop Filters. Text book 1: 10.1-10.5, 10.8, 19.1, 19.4, 19.5, 19.7-19.10							
Module-5 Linear Op-amp Circuits: Digital to Analog Conversion: Weighted Resistor DAC, R-2R DAC, Analog to Digital Conversion: Digital RAMP ADC, Successive Approximation ADC. Signal Processing Circuits: Saturating and Non Saturating Precision HWR, Precision FWR Using HWR and Summing Circuit. Nonlinear Op-Amp Circuits: Zero Crossing Detector, Inverting Schmitt Trigger Circuit, Non-Inverting Schmitt Trigger Circuit. DC Voltage Regulators: Introduction, Voltage Regulator Basics. Text book 3: 15.2, 15.4, 9.1, 9.2, 8.2-8.4, 13.1							

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

List of Text Books

Text Books:

1. Albert Malvino, David J Bates, Patrick E. Hoppe, Electronic Principles, 9th Edition, Mc Graw Hill Education, 2021.
2. Adel S Sedra, Kenneth C Smith, Microelectronic Circuits, 7th Edition, Oxford University Press, 2015.
3. David A. Bell, Operational Amplifiers and Linear ICs, 3rd Edition, Oxford University Press, 2011.

Reference Books:

1. Jacob Millman, Christos C. Halkias, Integrated Electronics: Analog and Digital Circuits and Systems, McGraw-Hill, 2015
2. Boylestad & Nashelsky, Electronic Devices and Circuit, Eleventh Edition, Pearson, January 2015.

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/108102112>
- https://onlinecourses.nptel.ac.in/noc25_ee157/preview
- <https://nptel.ac.in/courses/108106188>

Course Outcomes: At the end of the course the student will be able to:

CO1: Analyze the performance of BJT amplifier circuits using AC models, multistage amplifier concepts, and CE, CC, and CB configuration	L3
CO2: Analyze MOSFET biasing techniques and amplifier configurations using small-signal models to determine amplifier characteristics.	L3
CO3: Evaluate the operation and performance of negative feedback amplifiers, sinusoidal oscillators, and 555 timer circuits for electronic applications.	L3
CO4: Design power amplifier circuits and active filters to satisfy specified frequency response and power requirements.	L3
CO5: Analyze operational amplifier circuits, ADCs, DACs, and voltage regulators for signal processing and voltage regulation applications.	L3

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code: 1BEC304			Title: Analog Electronics and Linear Integrated Circuits					Faculty Name: Dr. Bhagyashree S R & Mr. Guruprasad K N				
List of Course Outcomes	Program Outcomes											Total
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	
CO-1	3	3	2	2	2	-	-	2	2	-	2	18
CO-2	3	3	2	2	2	-	-	2	2	-	2	18
CO-3	3	3	2	2	2	-	-	2	2	-	2	18
CO-4	3	3	3	2	2	-	-	2	2	-	2	19
CO-5	3	3	2	2	2	-	-	2	2	-	1	17
Total	15	15	11	10	10	-	-	10	10	-	9	90

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Subject Code: 1BEC304		Title: Analog Electronics and Linear Integrated Circuits	
List of Course Outcomes	Program Specific Outcomes		
	PSO1	PSO2	Total
CO-1	3	-	3
CO-2	3	-	3
CO-3	3	-	3
CO-4	3	-	3
CO-5	3	-	3
Total	15	-	15

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribute