

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE SESSION SEPTEMBER-DECEMBER, ODD SEMESTER, AY 2026-27

Course Syllabi with CO's

Faculty Name : Shilpashri V N			Academic Year: 2026-27				
Department: Electrical & Electronics Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
1BEE302	Analog Electronic Circuits	IPCC	Basic Electrical Engineering	3		2	42 hours Theory + 11 Lab slots
Objectives	1. To provide the knowledge for the analysis of transistor biasing and thermal stability circuits. 2. To develop skills to design the electronic circuits like amplifiers, power amplifiers and oscillators. 3. To understand the importance of FET and MOSFET and FET/MOSFET amplifiers.						
Topics Covered as per Syllabus							Teaching Hours
Module-1: Semiconductor Diode: Introduction, semiconductor materials, working principle and forward and reverse bias conditions, resistance levels, diode equivalent circuit, transition and diffusion capacitance, reverse recovery time. Half-wave and full-wave rectifiers, necessity of clippers and clampers, different types of clippers and clampers. Zenor diode, power Supply and series and parallel Voltage Regulators. Light emitting diodes (LEDs). Bipolar Junction Transistors: Introduction, NPN and PNP transistors, construction, operation. Characteristics of common base (CB), common emitter (CE) and common collector configuration, cutoff region, active region, and saturation region. Relation between collector current, base current and emitter current.							9
Revised Bloom's Taxonomy Level	L ₁ – Remembering, L ₂ – Understanding, L ₃ -Applying, L ₄ -Analysing						
Module-2: BJT Biasing: Introduction to biasing, operating point, bias configurations; fixed-bias, emitter bias, voltage divider bias, DC bias with voltage feedback, design of bias circuits, effect of temperature on bias; thermal runaway, bias stabilization, stability, stability factors of bias circuits. BJT AC Analysis: Amplification in AC domain, Transistor modelling for small signal analysis; resistance (r_e) model of CB, CE, and CC configurations, hybrid equivalent model CB, CE, and CC configurations, hybrid π model. Low frequency analysis, high frequency analysis.							9
Revised Bloom's Taxonomy Level	L ₁ – Remembering, L ₂ – Understanding, L ₃ -Applying, L ₄ -Analysing						
Module-3: BJT AC Analysis: Determination voltage and current gains, effect of R_L and R_S . General frequency considerations, low frequency response, miller's capacitance, high frequency response. Amplifier operation, common emitter amplifier - DC and AC analysis (base and voltage divider bias only), multistage amplifier, Cascade and cascode connections, amplifier frequency response: decibel scale, Darlington circuits, analysis and design.							8

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Revised Bloom's Taxonomy Level	L ₁ – Remembering, L ₂ – Understanding, L ₃ -Applying, L ₄ -Analysing	
Module-4: Feedback Amplifiers: Feedback concept, different types, practical feedback circuits, analysis and design of feedback circuits. Feedback amplifier; phase and frequency considerations, oscillators operation, phase-shift, Wien-bridge, tuned and crystal oscillators. Power Amplifiers: Classification, analysis and design of Class A – Directly Coupled and Transformer Coupled, Class B- Complementary Symmetry and Push Pull, Class C and Class AB.		8
Revised Bloom's Taxonomy Level	L ₁ – Remembering, L ₂ – Understanding, L ₃ -Applying, L ₄ -Analysing	
Module-5: Field Effect Transistors: Introduction to FET, Construction, difference between FET, JFET and metal oxide Semiconductor Field Effect Transistor (MOSFET), N-Channel and P-Channel MOSFET in the Enhancement Mode and Depletion Mode, Characteristics, Transfer Characteristics, Fixed Bias, Self Bias and Voltage Divider Bias, DC and AC Analysis of JFET (only common source configuration with fixed bias) and MOSFET amplifiers.		8
Revised Bloom's Taxonomy Level	L ₁ – Remembering, L ₂ – Understanding, L ₃ -Applying, L ₄ -Analysing	
Practice (Laboratory) Part (PRACTICAL COMPONENT OF IPCC) Cycle-1 - Design and verify a full wave bridge rectifier with and without a capacitor filter for given output voltage obtainable from 230 V supply. Determine the performance parameters. - Experiments on clippers and clampers. - Conduct an experiment on a class B push-pull emitter-follower power amplifier to determine rms output power, DC supply power supplied to the amplifier and amplifier percent efficiency - Design a BJT - Crystal Oscillator for a given frequency. - Design a FET Hartley oscillator for a given frequency. Cycle-2 - Static Transistor characteristics for CE, CB and CC modes and determination of h parameters. - Single stage BJT RC coupled CE amplifier and determination of voltage gain, current gain, input and output impedances. Determine the bandwidth from the frequency response curve. - Single stage FET RC coupled CE amplifier and determination of voltage gain, current gain, input and output impedances. - Determination of gain, input and output impedance of BJT Darlington emitter follower with and without bootstrapping and determine gain and bandwidth from its frequency response curve. - Conduct an experiment on BJT cascode configuration and determine the dynamic resistance, gain of each transistor and the overall no load gain.		
List of Text Books		
TEXT BOOKS: - Electronic Devices and Circuit Theory, Robert L. Boylestad, Pearson Education, 12th edition. - Electronic Devices (Conventional Current Version), Thomas L. Floyd, Pearson Education, 10th edition (Global edition), 2018. - Electronic Devices and Circuits, David A Bell, Oxford University Press, 5th Edition, 2008.		

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List of Reference Books

1. Electronic principles, Albert Malvino and David Bates, McGraw-Hill publication, 8th edition, 2016.
2. A Textbook of Electrical Technology, Electronic Devices and Circuits, B.L. Theraja, A.K. Theraja, S. Chand Reprint, 2013.

Web links and Video Lectures (e-Resources)

1. https://falstad.com/circuit/?utm_source
2. https://www.analog.com/ltspace?utm_source
3. https://vlab.co.in/?utm_source
4. https://www.nptel.ac.in/courses/117101106?utm_source

Course Outcome	At the end of the course the student will be able to:
	CO1: Explain the operating principles, characteristics, and applications of semiconductor diodes, rectifiers and BJTs.[L2]
	CO2: Explain different transistor biasing circuits and Apply the principles of BJT biasing and small-signal amplifier circuits using different bias configurations and transistor models.[L3]
	CO3: Analyze BJT amplifier circuits to determine voltage and current gains, frequency response and the effects of source and load resistances using various amplifier configurations and transistor connections.[L4]
	CO4: Analyse the frequency response feedback amplifiers, oscillators and power amplifier circuits to evaluate their performance under different operating conditions.[L4]
	CO5: Explain the construction, operating principles, characteristics, and biasing of JFETs and MOSFETs and Analyze DC and AC performance of FET amplifier circuits in common-source configuration.[L4]

CIE: Theory component are 25 marks and that for the practical component is 25 marks

Theory component (25): Internal Assessment Marks (15) + other assessment (10)

The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC

Practical component (25): 15 marks for the conduction of the experiment and preparation of laboratory record, and 10 marks for the test to be conducted after the completion of all the laboratory sessions.

The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Note: 2 Session Tests are conducted during the semester and marks allotted based on average of 2 IAs.

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

Course Code:	1BEE302	TITLE: Analog Electronic Circuits									
List of Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	-	2	2	-	3	2	-	2
CO2	3	3	2	-	2	2	-	3	2	-	2
CO3	3	3	2	-	2	2	-	3	2	-	2
CO4	3	3	2	-	2	2	-	3	2	-	2
CO5	3	3	2	-	2	2	-	3	2	-	2

Note: 3 = Strong Contribution 2 = Average Contribution 1= Weak Contribution

- = No Contribution

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

Course Code:	1BEE302	TITLE: Analog Electronic Circuits
List of Course Outcomes	Program Specific Outcomes	
	PSO1	PSO2
CO1	3	-
CO2	3	-
CO3	3	-
CO4	3	-
CO5	3	-

