St. Thomas College of Engineering & Technology
Vellilode, Sivapuram PO. Mattanur. Kannur District, Kerala
Approved by AICTE New Delhi, Govt. Of Kerala and Affiliated to APJ Abdul Kalam Technological University

COURSE HANDOUT

(B. Tech - Semester 3)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COLLEGE VISION

To be an Institute of repute recognized for excellence in education, innovation, and social contribution.

COLLEGE MISSION

M1: Infrastructural Relevance - Develop, maintain and manage our campus for our stakeholders.
M2: Life-Long Learning - Encourage our stakeholders to participate in lifelong learning through industry and academic interactions.
M3: Social Connect - Organize socially relevant outreach programs for the benefit of humanity.

DEPARTMENT VISION

To produce professionally competent, ethically sound and socially responsible Electronics and Communication Engineers.

DEPARTMENT MISSION

M1: Provide excellent infrastructure and lab facilities for quality education.

M2: Promote industry-academic interactions to keep up with technological advancements.

M3: Develop interpersonal skills and social responsibility among students through project-based and team-based learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

Graduates of B. Tech ECE program after graduation will:

PEO1: Exemplify technical competence in designing, analyzing, testing and fabricating electronic circuits.

PEO2: Acquire leadership qualities, rapport, communication skills in the organization and adapt to changing professional and societal needs.

PEO3: Work effectively as individuals and as team members in multidisciplinary projects

PROGRAM OUTCOMES (POS)

Engineering Graduates will be able to:

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1: Define, design, implement, model, and test electronic circuits and systems that perform signal processing functions.

PSO2: Segregate and select appropriate technologies for implementation of a modern communication system.

CONTENTS

COURSE INFORMATION SHEETS OF SEMESTER 3 COURSES

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PCECL307

ANALOG CIRCUITS LAB

COURSE INFORMATION SHEET

PROGRAMME: ECE (UG)	**DEGREE**: BTECH
COURSE: ANALOG CIRCUITS LAB	**SEMESTER: 3** **L-T-P-CREDITS**: 3-1-0-4
COURSE CODE: **REGULATION**:2024	**COURSE TYPE**: LABORATORY
COURSE AREA/DOMAIN: CIRCUITS AND SYSTEMS	**CONTACT HOURS**:3hrs/week
CORRESPONDING THEORY COURSE CODE **(IF ANY)**: PCECT303	**THEORY COURSE NAME**: Analog Circuits

SYLLABUS

MODULE	DETAILS	HOURS
PART-A	**Part A: Experiments with Discrete Components (Any 6 mandatory)** 1. RC Integrating and Differentiating Circuits 2. Diode Clipping and Clamping Circuits 3. CE Amplifier – Gain Design & Frequency Response 4. CS MOSFET Amplifier – Gain Design & Frequency Response 5. Cascaded Amplifier (CE-CE) – Gain Design & Frequency Response 6. Cascode Amplifier – Gain Design & Frequency Response 7. Feedback Amplifiers – Current Series & Voltage Series 8. RC Oscillators – Phase Shift or Wien Bridge Oscillator 9. Power Amplifiers – Class B & Class AB (Transformer less) 10. Transistor Series Voltage Regulator – Load & Line Regulation	3HRS/EXPT

PART-B	**Part B: Simulation Experiments (Any 6 mandatory)** To be done using QUCS, Ki Cad, LTSPICE, or SPICE variants. Experiments parallel to Part A (1 to 10) to simulate the corresponding circuits.	3HRS/EXPT
Total hours		**33**

TEXT BOOKS/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T1	Electronic Devices and Circuits David A Bell Oxford University Press 5th edition,2008
T2	Electronic Circuits Analysis and Design 1D. Meganathan Yes Dee Publishing 1st edition,2023

COURSE PREREQUISITES:

COURSE CODE	COURSE NAME	DESCRIPTION	SEMESTER
		NIL	

COURSE OBJECTIVES:

- Familiarize students with the design of analog circuits using discrete components.
- Familiarize students with the simulation of basic analog circuits using software tools.

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COURSE OUTCOMES:

After the completion of the course, the student will be able to

COs / CO-PO/PSO MAPPING. /BLOOM'S TAXONOMY LEVEL	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
PCECL307.1	Design and demonstrate the functioning of basic analog circuits using discrete components													
	3	**2**	**2**						**3**			**3**	**3**	**2**
	APPLY													

PCECL307.2	Design and simulate the functioning of basic analog circuits using simulation tools													
	3	**2**	**2**		3				**3**			**3**	**3**	**2**
	APPLY													
PCECL307.3	Conduct trouble shooting of a given circuit and to analyze it.													
	3	**2**	**2**						**3**			**3**	**3**	**3**
	APPLY													
MAPPING AVERAGE	3	2	2		3				3			3	3	2.3

JUSTIFICATION FOR CO-PO/PSO MAPPING:

CO	PO/PSO	MAPPING LEVEL	JUSTIFICATION
PCECL307.1	PO1	3	It requires the application of fundamental knowledge in electronics and circuits.
	PO2	2	The activities require analyzing the circuit behaviour and solving design or functional issues, especially during troubleshooting.
	PO3	2	Designing circuits both practically and through simulation involves developing solutions for functional requirements.
	PO9	3	All activities generally involve collaborative learning and teamwork during labs and projects.
	PO12	3	Activities like troubleshooting, simulation, and hands-on design foster self-learning skills, particularly troubleshooting
	PSO1	3	Students define, design, implement, and test basic analog circuits (amplifiers, filters, oscillators), which are fundamental to **signal processing functions** like amplification, filtering, and waveform shaping.
	PSO2	2	Analog circuits demonstrated here are foundational to communication systems (e.g., modulation circuits), hence enabling students to **segregate and select appropriate circuits for communication subsystems**.
PCECL307.2	PO1	3	It requires the application of fundamental knowledge in electronics and circuits.

	PO2	2	The activities require analyzing the circuit behaviour and solving design or functional issues, especially during troubleshooting.
	PO3	2	Designing circuits both practically and through simulation involves developing solutions for functional requirements.
	PO5	3	Simulation tools usage maps strongly here (SPICE), justifying a level 3 mapping for the simulation activity.
	PO9	3	All activities generally involve collaborative learning and teamwork during labs and projects.
	PO12	3	Activities like troubleshooting, simulation, and hands-on design foster self-learning skills, particularly troubleshooting
	PSO1	3	Simulation provides opportunities to **model and test electronic circuits** digitally before physical implementation, contributing directly to signal processing system development.
	PSO2	2	Simulation tools expose students to circuit modelling relevant to **communication system building blocks**, although the direct system-level implementation is partial, so mapping is moderate.
PCECL307.3	PO1	3	It requires the application of fundamental knowledge in electronics and circuits.
	PO2	2	The activities require analyzing the circuit behaviour and solving design or functional issues, especially during troubleshooting.
	PO3	2	Designing circuits both practically and through simulation involves developing solutions for functional requirements.
	PO9	3	All activities generally involve collaborative learning and teamwork during labs and projects.
	PO12	3	Activities like troubleshooting, simulation, and hands-on design foster self-learning skills, particularly troubleshooting
	PSO1	3	Troubleshooting strengthens the capability to analyze and rectify signal processing circuits, ensuring they function correctly as per design specifications, fully aligning with **PSO1**.
	PSO2	3	By analyzing faults in circuits, students learn to evaluate and **select**

			correct circuit strategies beneficial in communication systems development, justifying a moderate (2) mapping.

CORRELATION Levels: 3- Substantial (High) 2- Moderate (Medium) 1-Slight (Low)

GAPS IN THE SYLLABUS-TO MEET INDUSTRY/PROFESSION REQUIREMENTS

SL NO:	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POS /PSOS
1	Lacks PCB design	Conduct workshops to introduce basic PCB design using Ki Cad	PO1, PO2, PO3, PO4, PO5,PO12, PSO1

CONTENT BEYOND THE SYLLABUS/ADVANCED TOPICS/DESIGN

SL NO:	DESCRIPTION	PROPOSED ACTIONS	RELEVANCE WITH POS /PSOS
1.	Small circuit designs using discrete components/ICs	Link provided. Interested students shall implement small projects during free time or SIG hours	PO1,PO2,PO3,PO5, PO9,PO10,PO12, PSO1

WEB SOURCE REFERENCES:

SL NO:	DESCRIPTION
1	https://www.allaboutcircuits.com/projects/category/analog/

DELIVERY TECHNOLOGIES

CLASSROOM WITH BLACK BOARD/WHITE BOARD/SMART BOARD	▯	**ICT TOOLS**	
CLASSROOM WITH LCD PROJECTOR		**ELECTRONIC CLASSROOM**	

INSTRUCTION METHODS

FACE TO FACE INSTRUCTION	Direct		**FLIPPED CLASSROOM**	
	Project-based instruction	▯	**BLENDED LEARNING**	
	Problem-based instruction		**ONLINE COURSES/MOOCs**	
	Technology enhanced learning	▯	**OTHERS (IF ANY)**	
	Experiential learning	▯		
	Participative learning			

CO ASSESSMENT TOOLS-DIRECT

ASSIGNMENTS		**TUTORIALS**		**SERIES EXAMINATIONS**		**UNIVERSITY EXAM**	▯
LAB PRACTICES	▯	**VIVA**	▯	**INTERNAL LAB EXAM**	▯	**REPORT/ DOCUMENT PREPARATION**	▯
PRESENTATION		**EVALUATION BY GUIDE**		**INTERIM EVALUATION**		**FINAL EVALUATION**	

CO ASSESSMENT TOOLS -INDIRECT

ASSESSMENT OF COURSE OUTCOMES (BY COURSE EXIT (END) SURVEY)	▯

ASSESSMENT ITEMS /CLASS SESSIONS/LAB/FIELD/TUTORIAL HOURS FOR EACH COURSE OUTCOMES

CO	ASSESSMENT ITEMS	CLASS SESSIONS	LAB/FIELD/TUTORIAL HOURS
PCECL307.1	CA,IE	-	LAB-21HRS

PCECL307.2	CA,IE	-	LAB-12HRS
PCECL307.3	CA,IE	-	LAB-21+12 HRS
		TOTAL HOURS OF INSTRUCTION	33

Prepared by
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Approved by HOD