RAMCO INSTITUTE OF TECHNOLOGY
Approved by AICTE, New Delhi & Affiliated to Anna University
NAAC Accredited with 'A+' Grade & An ISO 9001: 2015 Certified Institution
NBA Accredited UG Programs: CSE, EEE, ECE and MECH

Department of Electronics and Communication Engineering

Academic Year 2024-2025

VALUE ADDED COURSE REPORT

Title of the Course: Circuit Design: Concepts to Reality
Year/Branch: II Year / ECE - A & B
Duration: 03.02.2025 to 07.02.2025
Venue: DSP Lab, EDC Lab, LIC Lab
Total Participants: 62 Students

Faculty Members Involved:
Coordinator:

- Dr. A. Lakshmi, Professor/ECE

Course Handling Faculty:

- Dr. C. Arunachalaperumal, Professor & Head /ECE
- Dr. A. Lakshmi, Professor/ECE
- Dr. R. Rajalakshmi, Associate Professor/ECE
- Mrs. V. SrirengaNachiyar, AP(SG)/ECE
- Mr. A. Rameshbabu, AP/ECE
- Mrs. V. Krishna Meera, AP/ECE

Introduction:

The **Value Added Course (VAC) on "Circuit Design: Concepts to Reality"** was successfully conducted by the **Department of Electronics and Communication Engineering (ECE), Ramco Institute of Technology, Rajapalayam,** from **3rd February 2025 to 7th February 2025**. This course was designed to provide **in-depth theoretical knowledge and hands-on experience in electronic circuit design**, covering fundamental topics such as **basic electronic components, semiconductor devices, transistors, operational amplifiers, and multivibrators**. The structured learning approach incorporated **theory sessions, practical implementation, simulation-based learning, and a mini-project**, ensuring a **comprehensive understanding of circuit design principles**. The primary objective of this course was to **equip students with essential circuit design and troubleshooting skills**, thereby bridging the gap between **academic learning and real-world engineering applications**.

Dr. **C. Arunachalaperumal, Head of the Department, ECE, Ramco Institute of Technology**, highlighted the **importance of practical exposure in circuit design**, emphasizing that **hands-on experience is crucial for engineering students** to gain a deeper understanding of **circuit behavior, signal processing, and electronic component integration**. He encouraged students to **actively participate** in all sessions and take advantage of this opportunity to strengthen their **technical knowledge and problem-solving abilities**.

Dr. **A. Lakshmi, Professor/ECE and Faculty Coordinator**, stated that the VAC was designed to provide a **structured progression from basic to advanced circuit concepts**, allowing students to develop **confidence in circuit implementation and testing**.

Dr. **R. Rajalakshmi, VAC Coordinator**, emphasized the need for a **practical approach to learning**, where students not only **understand theoretical concepts** but also **apply them through simulations and real-time hardware testing**.

The course was structured into **five key units**, each consisting of **theory, practical sessions, and simulations**.

Day 1 focused on **Basic Electronic Components**, introducing students to **resistors, capacitors, inductors, LEDs, relays, switches, transformers, and voltage sources**. The session, handled by **Mrs.V.Krishna Meera** and **Mrs. V. SrirengaNachiyar**, covered **fundamental electrical concepts and measurement techniques using multimeters**. A **practical session on soldering fundamentals and PCB designing using Eagle Software**, conducted by **Mr. A. Rameshbabu**, provided students with **hands-on experience in assembling circuits and designing PCB layouts**. This session was crucial in helping students **develop hardware prototyping skills**, which are essential for **real-world electronic system design**.

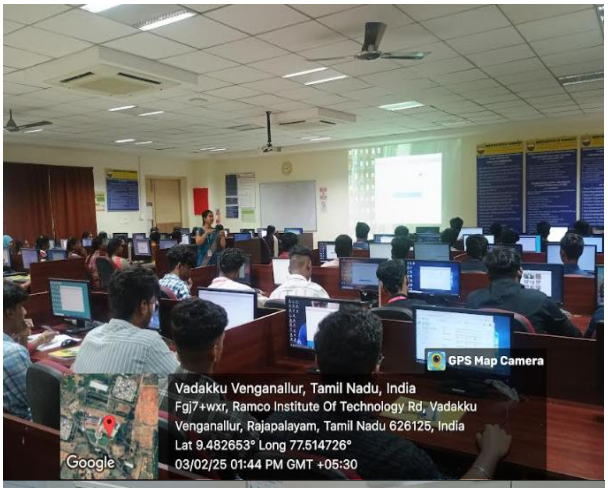
Learning Outcomes

- Understood the **functions, characteristics, and applications of basic electronic components** like resistors, capacitors, inductors, LEDs, relays, and transformers.

- Gained hands-on experience in **soldering techniques and PCB designing using Eagle Software**.

Key Takeaways

- **Basic electronic components form the foundation of all circuit designs and electrical systems**.
- **PCB designing and soldering skills** are essential for **circuit prototyping and hardware implementation**.



On **Day 2**, **Mrs. V. Krishna Meera** introduced students to **semiconductor diodes**, including **PN junction diodes, clipper and clamper circuits, and rectifiers**. The session explained **diode biasing, characteristics, and switching applications**, essential for designing **rectifier circuits used in power supplies**. **Mrs. V. SrirengaNachiyar** led the **practical session on rectifier circuit design**, where students implemented **half-wave, full-wave, and bridge rectifier circuits with filters**. This session enabled students to **analyze rectifier performance, measure output waveforms using oscilloscopes, and understand filtering techniques**.

Learning Outcomes

- Understood the **working principles, biasing, and applications of PN junction diodes, clipper, and clamper circuits**.
- Gained hands-on experience in **designing and testing rectifier circuits with filters for power supply applications**.

Key Takeaways

- **Diodes are essential for rectification, signal processing, and voltage regulation in electronic circuits**.
- **Practical implementation of rectifier circuits** helped students analyze **AC to DC conversion and filter performance**.

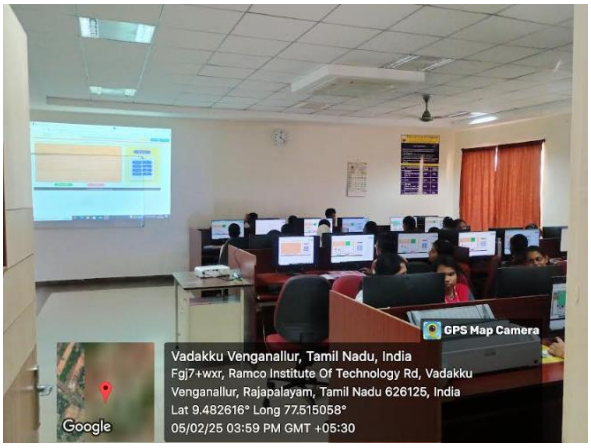
Day3 focused on **Multivibrators and Timer Circuits**, handled by **Dr. C. Arunachalaperumal and Mr. A. Rameshbabu**. Students were introduced to **Astable, Monostable, and Bistable Multivibrators**, as well as **Timer IC 555, Signal Generators, and Pulse Width Modulation (PWM) circuits**. The practical session handled by **Dr.R.Rajalakshmi** and **Mr. A. Rameshbabu** allowed students to **design, simulate, and test multivibrator circuits**, reinforcing their understanding of **waveform generation and pulse modulation techniques**.

Learning Outcomes

- Understood **Astable, Monostable, and Bistable Multivibrators** and their applications.
- Designed and tested **multivibrators using Timer IC 555** with oscilloscope analysis.
- Learned **Pulse Width Modulation (PWM) applications** in signal processing and power electronics.

Key Takeaways

- **Multivibrators** are essential for **timing, frequency generation, and memory circuits**.
- **Timer IC 555** is widely used in **waveform generation and PWM control**.
- Hands-on **oscilloscope waveform analysis** improved circuit debugging skills.



Day 4 covered **Transistors and Their Applications**, handled by **Dr. A. Lakshmi**. The session introduced **NPN and PNP transistor configurations (CB, CE, CC), transistor biasing, and applications in amplification and switching**. Students learned **how transistors function as amplifiers and oscillators, crucial for signal processing and communication systems**. The **practical session**, led by **Mrs. V. Krishna Meera**, focused on designing

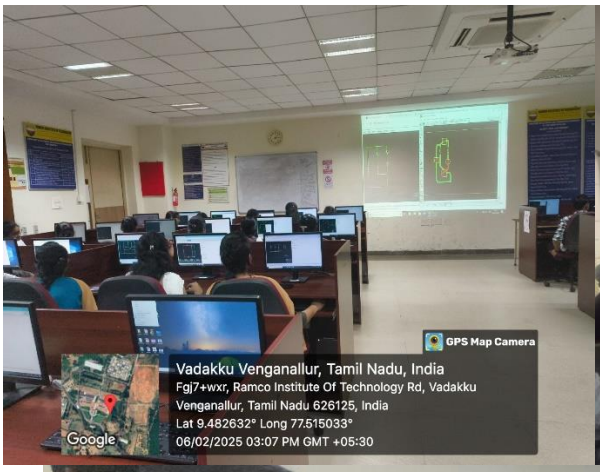
transistor-based amplifier and oscillator circuits, where students experimented with **transistor switching properties, signal amplification, and feedback control**.

Learning Outcomes & Key Takeaways:

- Understood **NPN & PNP transistors, their configurations (CB, CE, CC), and biasing techniques** for switching and amplification.
- Gained practical experience in **designing and implementing transistor-based amplifiers and oscillators**.

Key Takeaways

- Learnt how to select the right transistor for particular application
- Learnt how transistors are used as switch to control the flow of current and amplifier to increase the strength of signal
- Safety precautions when working with transistor and handling the device



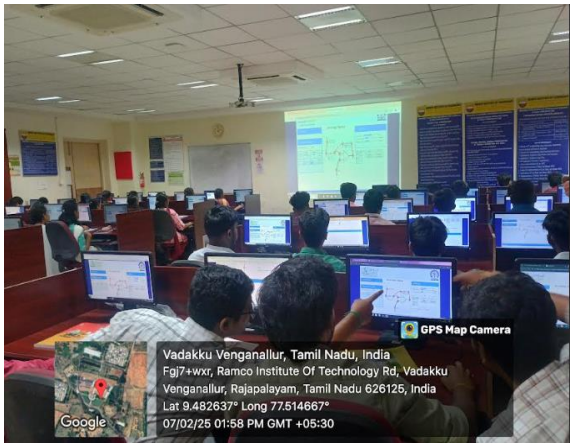
On **Day 5, Dr. R. Rajalakshmi** introduced **Operational Amplifiers (Op-Amps)**, covering **symbol representation, pin configuration, inverting and non-inverting amplifier circuits, and voltage regulators using Op-Amps and Zener diodes**. The practical session, conducted by **Dr. R. Rajalakshmi** and **Mr. A. Rameshbabu**, involved **simulating Op-Amp circuits in Virtual Lab software and implementing an inverting amplifier using IC 741**. Students gained **hands-on experience in analog electronics, voltage regulation, and signal processing applications**.

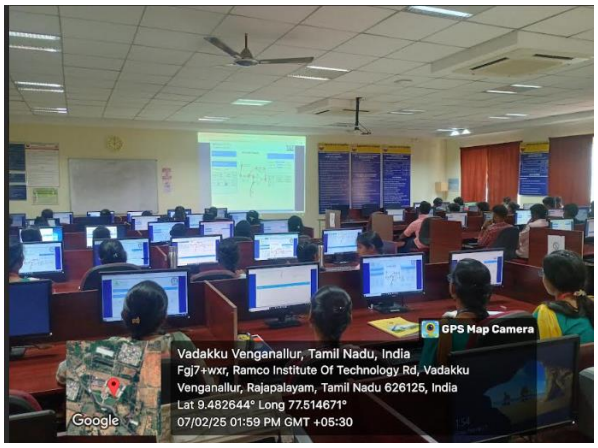
Learning Outcomes (Day 4: Analog Electronics & Operational Amplifiers)

- Understood the **working principles, configurations (Inverting & Non-Inverting), and applications of Operational Amplifiers (Op-Amps)**.
- Gained hands-on experience in **designing and testing voltage regulators using Op-Amps and Zener diodes**.

Key Takeaways

- **Op-Amps are widely used in signal processing, filtering, and voltage regulation applications**.
- **Practical exposure to Op-Amp circuits** improved students' ability to **analyze and implement real-time analog circuit applications**.





Mini-Project development instruction was given by **Dr. A. Lakshmi and Dr. R. Rajalakshmi**. A **quiz-based Assessment was conducted and evaluation** assessed students' understanding of circuit concepts. **Student Participation and Engagement** were excellent, with **all 62 students actively involved** in **theoretical discussions, hands-on exercises**. The participated students **successfully completed PCB design and soldering tasks**, demonstrating a **high level of technical engagement and practical learning**.

Feedback & Observations from students highlighted the **practical exposure as the most beneficial aspect of the VAC**. Many students appreciated the **real-time circuit design exercises and simulations**, which helped them **develop a strong foundation in electronic system implementation**. Faculty members noted that students **showed significant improvement in problem-solving abilities and practical circuit understanding**.

Suggestions for Future Improvement include **expanding the course to include Arduino-based circuit design, incorporating IoT applications, and providing industry-based case studies**. Students also requested **more advanced PCB prototyping sessions and additional real-world circuit challenges**.

The **Value Added Course on Circuit Design** was a **highly successful initiative**, strengthening students' **technical proficiency and practical understanding of circuit implementation**. The **structured approach, expert faculty guidance, and engaging hands-on activities** provided **valuable learning experiences** that will benefit students in **future academic projects and industry applications**. With **more simulation-based exercises, extended project-based learning, and real-world applications**, the course can be **further refined to enhance students' electronics expertise**.