



RAMCO INSTITUTE OF TECHNOLOGY

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Department of Electronics and Communication Engineering Academic Year 2024-2025 (Odd Semester) Planning Document

Degree, Semester & Branch: VII Semester B.E.Mechanical

Course Code & Title: OEC352 Fundamentals of Electronic Devices and Circuits

Name of the Faculty member: Mr.R.Ramasamy

- **Unit/Topic:** Unit-V / DC/DC convertors –Buck-Boost analysis and design
- **Course Outcome:** CO5
- **Topic Learning Outcome:** TLO 19
- **Activity Chosen:** Flipped classroom

Learning Outcomes:

The Student will be able to

- ❖ Analyze the fundamental working principles of buck-boost converters and their role in DC/DC power conversion.
- ❖ Evaluate the key parameters, such as voltage gain, efficiency, and duty cycle, under continuous and discontinuous conduction modes.
- ❖ Develop and design buck-boost converter circuits tailored to meet specific voltage regulation and power requirements.
- ❖ Implement strategies to enhance the efficiency, stability, and reliability of buck-boost converters under various load conditions.

Justification:

The analysis and design of DC/DC converters, specifically the Buck-Boost topology, are critical in modern power electronics. These converters are widely used in applications requiring efficient voltage regulation where input and output voltage levels can vary significantly. The Buck-Boost converter offers the flexibility to step up or step down the voltage, making it an essential component in renewable energy systems, electric vehicles, and portable electronics. Understanding the operational principles, including mode analysis (continuous and discontinuous conduction), efficiency considerations, and stability, enables the design of optimized systems. Furthermore, advancements in semiconductor technologies necessitate a robust understanding of Buck-Boost converter design to cater to dynamic performance requirements such as high efficiency, minimal size, and reliable operation under varying load conditions.

Time Allotted for the Activity: 50 Minutes

• Details of the Implementation:

(i) Materials for the Activity:

The materials for the preparation of the students will be shared one week before through LMS Canvas. Including the material, students were asked to refer to the web content also.

References:

Book Title/ Author/ Publisher/ Edition	Page No.
1. Muhammad H.Rashid, "Power Electronics", Pearson Education / PHI, 2004.	211-223

Websites
1. https://nptel.ac.in/courses/108108036
2. https://nptel.ac.in/courses/117108124

(ii) Formation of Groups:

Student groups were created as below:

- Class Strength: 63
- Number of groups: 10
- Members per group: 04(7) + 05(6) + 01(5)

• **Plan for Implementing this Activity:**

- Ten groups are formed, each with 5, 6, or 7 members.
- Each group is assigned a name and is known as a home group.
- Each expert group is assigned one topic.
 - **DC-DC Converters**
 - **Buck Converters**
 - **Boost Converters**
 - **Buck Boost Converters**
- The expert group members discuss the topic in detail for 20 minutes using the learning materials already posted on the course website, Canvas.
- The expert group members should return to their original small groups and discuss the points with the other members for 30 minutes.
- All the members in the home group learn about all the topics through the expert group members.
- Finally, one member from each group should summarize the points of the topic 'Fixed and Floating Point Representation' to the class for 20 minutes.
- Review of points and conclusion of the activity (5 minutes).
- Thus the concept of DC-DC Converters is known to all by involving the students actively.

Expected Difficulties:

- Lack of preparation: Making the students to learn the materials is the challenging task.
- Each student has to read the material posted in the course website.
- Non participation in the activity: All the students should be made involve in the activity
- Time management: The Flipped classroom activity should be able to complete in the planned duration.

Plan for preventing these difficulties:

- Make each student accountable by conducting formative and summative assessments of both individual and group performance.
- Including the assessment mark in the final internal mark calculation encourages each student to participate actively in the flipped classroom activity.
- Each student's contribution mark in the assessment will be based on the discussions on the course website and WhatsApp group, through which all students will participate in the activity.
- Posting announcements periodically to aid learning and prepare for the presentation.
- Time management will be ensured by using a timer clock with a 10-minute duration.

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Active Learning Practices

Degree, Semester & Branch: VII Semester B.E., Mechanical

Course Code & Title: OEC352 Fundamentals of Electronic Devices and Circuits

Name of the Faculty member: Mr.R.Ramasamy

Active Learning Practices Execution

UNIT V POWER AMPLIFIERS AND DC/DC CONVERTERS

Activity: Flipped classroom

Topic: DC/DC convertors –Buck-Boost analysis and design



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UNIT IV CONCEPTS OF STABILITY ANALYSIS

Activity: Zero Minute Speech

Topic: Tuned amplifiers-Double Tuned & its frequency response

