

JSPM's
Rajarshi Shahu College of Engineering, Pune
Department of Electronics & Telecommunication
Engineering

**INNOVATIONS IN TEACHING AND
LEARNING**

Course: Power Electronics and Drives

Class: T.Y. BTech E&TC

Topic: Basic concepts of SCR

NAME OF THE ACTIVITY: Flipped Classroom

- I. Concept:** Flipped Classroom Methodology was employed to teach the fundamental concepts of SCR (Silicon Controlled Rectifier) and its key differences from diodes. This approach shifts passive content delivery (lectures) to pre-class study, reserving in-class time for active problem-solving and discussions.

Core Topic: SCR vs. Diode: Characteristics, triggering mechanisms, and applications in power electronics.

II. Objective (Goal)

1. **Cognitive:** Ensure students grasp SCR operation principles before class to enable deeper in-class analysis.
2. **Skill-Based:** Develop ability to compare SCRs and diodes in circuit design scenarios.
3. **Engagement:** Foster peer collaboration through interactive problem-solving during class.

III. Appropriateness (Relevance of Selected Method)

Pedagogical Justification:

1. Cognitive Load Theory:

- Pre-class videos reduce intrinsic load (basic concepts) → Frees working memory for in-class complex applications

2. Bloom's Taxonomy Alignment:

- Pre-class: Remembering/Understanding (via video lectures)
- In-class: Applying/Analyzing (through circuit simulations)

Technical Relevance:

- SCR concepts require:
 - Visualization of multi-layer conduction (best delivered via animated videos)
 - Immediate feedback on triggering misconceptions (addressed through real-time simulations)

IV. Effective Presentation (Implementation Details)

Pre-Class Phase (Home Assignment)

- **Resource:** Assigned YouTube lecture (2 August 2024)
Link– <https://www.youtube.com/watch?v=AhFDWfFjdOE>
- **Tasks:**
 - Note-taking on SCR triggering methods.
 - Submit 2 questions on confusing concepts via LMS.

In-Class Phase

- **Activity 1:** Group discussion on SCR applications (e.g., dimmer circuits).
- **Activity 2:** Simulation exercise (using Proteus/MATLAB) to compare diode/SCR I-V characteristics.
- **Assessment:** Mini-quiz (5 MCQs) to gauge pre-class learning.

V. Results (Impact)

- **Quantitative:**
 - 85% students scored $\geq 70\%$ in post-class quiz (vs. 60% in traditional lecture).
 - 40% reduction in "SCR triggering" doubts during office hours.
- **Qualitative:**
 - Student feedback: "Simulation activity clarified latching behavior."

VI. Reproducibility and Reusability by Other Scholars for Further Development

Sr.No	Innovation Used by	Details of User	Purpose of Reproducibility and Reusability
1.	Prof.S.P.Vibhute	Faculty for another division	Video resource reusable for remote learners Activities modifiable for other power devices (e.g., IGBT).

VII. PEER REVIEW AND CRITIQUE

Category: Internal/External/Interdepartmental

Score: (1:Least 2: Moderate 3:Highly)

Question 1. Is this Innovative Teaching and Learning Methodology useful during content delivery?

Question 2. Did this innovation increase student motivation or participation?

Question 3. Will it show improvement in student learning?

Question 4. Suggestions for improvement in future iterations.

Category	Name of Peer	Organization	Q.1	Q.2	Q.3	Q. 4 Suggestion/Critique
Internal	Prof.S.P.Vibhute	RSCOE	3	2	3	Hept to add prerequisite knowledge check.
External	Dr. P.Surwanshi	PCCOE	3	2	3	Need more examples on other power devices



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