Department of Electrical and Electronics Engineering
Academic Year 2023 – 2024 (Odd Semester)

Degree, Semester & Branch: V Semester B.E. EEE
Course Code & Title: EE3591 Power Electronics
Name of the Faculty member: Mr. S. Meenakshi Sundaravel

Innovative Practice Description

- **Unit / Topic:** Unit IV / Controlled Rectifiers
- **Course Outcome:** CO 4
- **Topic Learning Outcome:** TLO 4c.
- **Activity Chosen:** Active Learning Method – MATLAB Simulation
- **Justification:**

Controlled rectifiers uses thyristor or SCR for AC to DC conversion. These can be classified as single phase rectifier and three phase rectifier. Single phase rectifiers are classified as 1-Φ half controlled rectifier or 1-Φ semiconverter and 1-Φ fully controlled rectifier. Three phase rectifiers are classified as 3-Φ half controlled rectifier or 3-Φ semiconverter and 3-Φ fully controlled rectifier. After teaching 1-Φ fully controlled rectifier and 1-Φ semiconverter, I had conducted a simulation activity for making the students to understand the operation of both the types in practical mode with various loads and also enhance their learning level and as a teacher I can judge the understanding level of the students.

- **Time Allotted for the Activity:** 40 minutes
- **Details of the Implementation:**

Total Strength is 64.

Photographer: A student – Mr. N. Sathyanarayanaperumal (953621105046)

Reporter: Myself

At the end the Class (Last 10 minutes)

✓ I asked the students to simulate the 1-Φ fully controlled rectifier and 1-Φ semiconverter for various loads for 30 minutes.

- ✓ Then I asked them to obtain the controlled output voltage waveform of them for another 5 minutes.
- ✓ Finally, I randomly asked students about the operation of 1-Φ fully controlled rectifier and 1-Φ semiconverter for 5 minutes.

- **CO – PO / PSO mapping:**

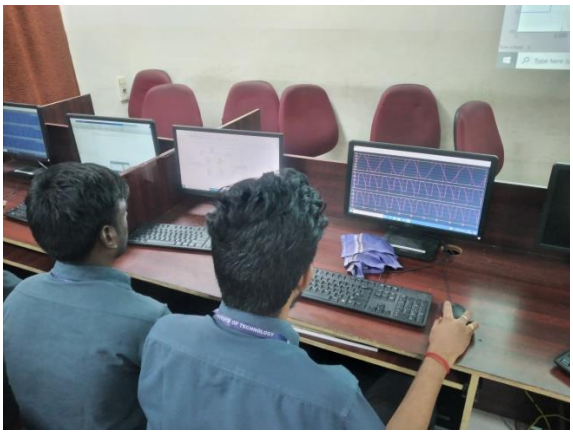
CO	PO 1	PO 2	PO 3	PO 5	PO10	PO12	PSO1	PSO3
CO 4	3	2	1	2	1	1	2	1

(1 – Low 2 – Moderate 3 – High)

- **PO / PSO mapped:**

Innovative practice	PO 5
	2
Justification for correlation	Students have utilized the modern tool MATLAB for performing simulation. Hence, this activity is correlated with level 2.

- **Images / Screenshot of the practice:**



Reflective Critique:

- ***Feedback of practice from students and other stakeholders:***

  Students were able to perform the simulation of 1-Φ fully controlled rectifier and 1-Φ semiconverter and also they said that they understood the functions of them.

- ***Benefit of the practice:***

1. Students can able to understand the impact of engineering solution on society.
2. Students understood the concept which was reflected from their answers for the questions I have asked.
3. The success of the activity was evaluated by asking the same question during IAT – I **– Around 80% of students answered.**
4. Students can able to explain the concepts in detail in the examination.

- ***Challenges faced in implementation:***

1. Time utilization for conducting activity, slow learners were not able to perform the simulation quickly.

References:

✓ P.S.Bimbra "Power Electronics" Khanna Publishers, Third Edition, 2003.

Signature of Faculty Member **HOD**

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Course Code & Title: EE3591 Power Electronics
Name of the Faculty member: Mr. S. Meenakshi Sundaravel

Innovative Practice Description

- **Unit / Topic:** Unit V / AC Phase Controllers
- **Course Outcome:** CO 5
- **Topic Learning Outcome:** TLO 5c.
- **Activity Chosen:** Active Learning Method – Demonstration using Modern tool (FLUKE Power Quality Analyzer)
- **Justification:**

  AC voltage controllers (ac line voltage controllers) are employed to vary the RMS value of the alternating voltage applied to a load circuit. An AC voltage controller is a type of thyristor power converter which is used to convert a fixed voltage, fixed frequency ac input supply to obtain a variable voltage ac output. The RMS value of the ac output voltage and the ac power flow to the load is controlled by varying (adjusting) the trigger angle 'α'. The ac voltage controllers are classified into two types based on the type of input ac supply applied to the circuit. Single Phase AC Controllers and three Phase AC Controllers. Single phase ac controllers operate with single phase ac supply voltage of 230 V RMS at 50 Hz in our country. Three phase ac controllers operate with 3 phase ac supply of 400 V RMS at 50Hz supply frequency. Applications of AC Voltage Controllers are Lighting / Illumination control in ac power circuits, Induction heating, Industrial heating & Domestic heating, Transformers tap changing (on load transformer tap changing) and Speed control of induction motors (single phase and poly phase ac induction motor control).

- **Time Allotted for the Activity:** 40 minutes
- **Details of the Implementation:**

  Total Strength is 64.

  Photographer: A student – Mr. K. Govindharaj (953621105020)

  Reporter: Myself

  At the end the Class (Last 10 minutes)

✓ I have demonstrated the students about the operation of 1-Φ AC Voltage controllers using

FLUKE Power Quality Analyzer for about 30 minutes.

- ✓ Then I have demonstrated to observe the output voltage and current waveforms, how to get FFT analysis waveform of output voltage include THD value and all harmonic component values with the help of FLUKE Power Quality Analyzer to them for another 5 minutes.
- ✓ Finally, I randomly asked students about the operation of 1-Φ full wave AC voltage controller for 5 minutes.

- **CO – PO / PSO mapping:**

CO	PO 1	PO 2	PO 3	PO 5	PO10	PO12	PSO1	PSO3
CO 4	3	2	1	2	1	1	2	1

(1 – Low 2 – Moderate 3 – High)

- **PO / PSO mapped:**

Innovative practice	PO 5
	2
Justification for correlation	Students have utilized the modern tool FLUKE Power Quality Analyzer for analyzing the performance of a power electronic controller. Hence, this activity is correlated with level 2.

- **Images / Screenshot of the practice:**

Reflective Critique:

- ***Feedback of practice from students and other stakeholders:***

  Students were able to differentiate the usage of CRO/DSO with FLUKE Power Quality Analyzer and realized the importance of FLUKE meter in various aspects.

- ***Benefit of the practice:***

1. Students can able to understand the impact of engineering solution on society.
2. Students understood the concept which was reflected from their answers for the questions I have asked.
3. The success of the activity was evaluated by asking the same question during IAT – II **– Around 80% of students answered.**
4. Students can able to explain the concepts in detail in the examination.

- ***Challenges faced in implementation:***

1. Time utilization for conducting activity.

References:

✓ P.S.Bimbra “Power Electronics” Khanna Publishers, Third Edition, 2003.

Signature of Faculty Member **HOD**