

T. Y. B. Tech (Electrical and Computer Engineering)

Trimester: V

Subject: Electric vehicle technology

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Experiment No: 04

Name of the Experiment: Simulation of the Rectifier for Electric Vehicle in MATLAB

Performed on

Marks

Teacher's Signature with date

Submitted on

Aim: To understand the Simulation of Rectifier for EV

Objective:

The objective of this experiment is to simulate the rectifier circuit commonly used in electric vehicles using MATLAB. The rectifier converts alternating current (AC) from the power grid into direct current (DC) suitable for charging the batteries of elect

Theory:

In an electric vehicle, the rectifier circuit is crucial for converting AC power from charging stations into DC power usable by the vehicle's battery system. The rectifier typically consists of diodes arranged in a bridge configuration to rectify the AC input. The output voltage of the rectifier is smoothed using capacitors to reduce ripple, providing a stable DC voltage for charging.

Procedure:

- Launch MATLAB: Open MATLAB on your computer.
- Create a New Script: Click on "New Script" from the MATLAB toolbar to open a new script window.
- Write MATLAB Code: Write MATLAB code to simulate the rectifier circuit. Use functions such as 'sin' to generate an AC input waveform and implement the rectification process using diodes.
- Define Parameters: Define parameters such as input voltage, frequency, diode characteristics, and capacitor values.
- Simulate the Circuit: Run the MATLAB script to simulate the rectifier circuit.
- Plot Results: Plot the input and output waveforms to visualize the rectification process and analyze the performance of the rectifier.
- Optimization (Optional): Experiment with different parameters to optimize the performance of the rectifier, such as reducing ripple voltage or improving efficiency.

Parameters:

- Input Voltage: The AC voltage supplied from the charging station.
- Frequency: Frequency of the AC input waveform.
- Diode Characteristics: Forward voltage drop, reverse recovery time, etc.
- Capacitor Values: Capacitance values used for smoothing the output voltage.
- Load Resistance: Resistance representing the battery or load connected to the rectifier output.

Conclusion:

In this experiment, we successfully simulated the rectifier circuit for electric vehicles using MATLAB. By analyzing the input and output waveforms, we can assess the rectifier's performance in converting AC to DC power. Understanding the behavior of the rectifier is essential for designing efficient charging systems for electric vehicles, ensuring reliable operation and optimal battery charging. Further experiments can explore advanced rectifier topologies and control techniques to enhance efficiency and performance.

