

## Pre-Lab 1: Half-Wave Rectifier

### • INTRODUCTION

Diodes are a critical part of DC power supplies. The half-wave rectifier is the simplest type of AC-to-DC converter. The overall goal of PreLab1 is to simulate some half-wave rectifier circuits that you will test during the lab session.

### • GENERAL GUIDELINES

- 1) Each student must turn in his/her own Pre-Lab assignment (include both schematics and waveforms).
- 2) Students are allowed (even encouraged) to work together. **However, you must turn in your own work!** Turning in multiple printouts of the same schematic/waveforms (with different student names) will result in ZERO points.
- 3) You will be using the program Multisim for all simulations. The program is installed on all of the computers in N100, N102, and N106.

NOTE: There will be two lab exams during the term. Each lab exam will test each student's ability to use Multisim and build/test a circuit.

### • PART 1: HALF-WAVE RECTIFIER

**TASK 1a:** Simulate the half-wave rectifier shown below. Use the tutorial on the WEB site to get started.

- The voltage source is a sine wave generator ( $10V_{pp}$ , 60 Hz) in series with a 50 ohm resistor. This is a pretty good approximation of the Agilent 33220 function generators in N100.
- Note that  $10 V_{pp}$  means **peak-to-peak**, so the sine wave amplitude is actually 5 V.
- The 1N4002 diode can be selected from the place menu by selecting: component | Diodes | Diode | 1N4004G.
- The resistor is 10 kohm.
- From the menu bar select: simulate | Analysis | Transient. Set the End Time to .05 s and the minimum number of points to 1000.
- After running the simulation a "Grapher" screen will pop up. Turn on the Grid. From the Cursor menu select show cursors and then select to the next Y MAX  $\Rightarrow$ . After the cursor goes to the maximum point select Add Data Label at Cursor.
- Your simulated waveform should look like the graph shown below.
- Turn in both the schematic and waveform.

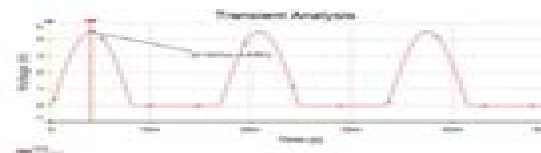


Figure 1: Circuit schematic and simulated load voltage.

# Half Wave Rectifier Lab Manual

**Paul B. Zbar, Albert Paul Malvino**



## **Half Wave Rectifier Lab Manual:**

*ELECTRONICS LAB MANUAL (VOLUME 2)* NAVAS, K. A., 2018-10-01 This book is evolved from the experience of the author who taught all lab courses in his three decades of teaching in various universities in India The objective of this lab manual is to provide information to undergraduate students to practice experiments in electronics laboratories This book covers 118 experiments for linear analog integrated circuits lab communication engineering lab power electronics lab microwave lab and optical communication lab The experiments described in this book enable the students to learn Various analog integrated circuits and their functions Analog and digital communication techniques Power electronics circuits and their functions Microwave equipment and components Optical communication devices This book is intended for the B Tech students of Electronics and Communication Engineering Electrical and Electronics Engineering Biomedical Electronics Instrumentation and Control Computer Science and Applied Electronics It is designed not only for engineering students but can also be used by BSc MSc Physics and Diploma students KEY FEATURES Contains aim components and equipment required theory circuit diagram pin outs of active devices design tables graphs alternate circuits and troubleshooting techniques for each experiment Includes viva voce and examination questions with their answers Provides exposure on various devices TARGET AUDIENCE B Tech Electronics and Communication Engineering Electrical and Electronics Engineering Biomedical Electronics Instrumentation and Control Computer Science and Applied Electronics BSc MSc Physics Diploma Engineering      *Laboratory Manual for Introductory Electronics Experiments* L. K. Maheshwari, M. M. S. Anand, 1979      **Industrial Electronics: A Text-lab Manual** Paul B. Zbar, 1972      **Engineering Practices Lab Manual - 5Th E T Jeyapoovan Nadar**, Engineering Practices Lab Manual covers all the basic engineering lab practices in the Civil Mechanical Electrical and Electronics areas The manual details the various tools to be used and exercises to be practiced in the application of engineering practices in each field      *Lab Manual for Electronics* Martin Feldman, 2001-11 The emphasis is first on understanding the characteristics of basic circuits including resistors capacitors diodes and bipolar and field effect transistors The readers then use this understanding to construct more complex circuits such as power supplies differential amplifiers tuned circuit amplifiers a transistor curve tracer and a digital voltmeter In addition readers are exposed to special topics of current interest such as the propagation and detection of signals through fiber optics the use of Van der Pauw patterns for precise linewidth measurements and high gain amplifiers based on active loads KEY TOPICS Chapter topics include Thevenin s Theorem Resistive Voltage Division Silicon Diodes Resistor Capacitor Circuits Half Wave Rectifiers DC Power Supplies Diode Applications Bipolar Transistors Field Effect Transistors Characterization of Op Amp Circuits Transistor Curve Tracer Introduction to PSPICE and AC Voltage Dividers Characterization and Design of Emitter and Source Followers Characterization and Design of an AC Variable Gain Amplifier Design of Test Circuits for BJT s and FET s and Design of FET Ring Oscillators Design and Characterization of Emitter Coupled Transistor Pairs Tuned Amplifier and

Oscillator Design of Am Radio Frequency Transmitter and Receiver Design of Oscillators Using Op Amps Current Mirrors and Active Loads Sheet Resistance Design of Analog Fiber Optic Transmission System Digital Voltmeter      **Basic Electronics Engineering** Satya Sai Srikant,Prakash Kumar Chaturvedi,2020-04-27 This book is primarily designed to serve as a textbook for undergraduate students of electrical electronics and computer engineering but can also be used for primer courses across other disciplines of engineering and related sciences The book covers all the basic aspects of electronics engineering from electronic materials to devices and then to basic electronic circuits The book can be used for freshman first year and sophomore second year courses in undergraduate engineering It can also be used as a supplement or primer for more advanced courses in electronic circuit design The book uses a simple narrative style thus simplifying both classroom use and self study Numerical values of dimensions of the devices as well as of data in figures and graphs have been provided to give a real world feel to the device parameters It includes a large number of numerical problems and solved examples to enable students to practice A laboratory manual is included as a supplement with the textbook material for practicals related to the coursework The contents of this book will be useful also for students and enthusiasts interested in learning about basic electronics without the benefit of formal coursework      Laboratory Manual for Pulse-Width Modulated DC-DC Power Converters Marian K. Kazimierczuk,Agasthya Ayachit,2015-10-26 Designed to complement a range of power electronics study resources this unique lab manual helps students to gain a deep understanding of the operation modeling analysis design and performance of pulse width modulated PWM DC DC power converters Exercises focus on three essential areas of power electronics open loop power stages small signal modeling design of feedback loops and PWM DC DC converter control schemes and semiconductor devices such as silicon silicon carbide and gallium nitride Meeting the standards required by industrial employers the lab manual combines programming language with a simulation tool designed for proficiency in the theoretical and practical concepts Students and instructors can choose from an extensive list of topics involving simulations on MATLAB SABER or SPICE based platforms enabling readers to gain the most out of the prelab inlab and postlab activities The laboratory exercises have been taught and continuously improved for over 25 years by Marian K Kazimierczuk thanks to constructive student feedback and valuable suggestions on possible workroom improvements This up to date and informative teaching material is now available for the benefit of a wide audience Key features Includes complete designs to give students a quick overview of the converters their characteristics and fundamental analysis of operation Compatible with any programming tool MATLAB Mathematica or Maple and any circuit simulation tool PSpice LTSpice Synopsys SABER PLECS etc Quick design section enables students and instructors to verify their design methodology for instant simulations Presents lab exercises based on the most recent advancements in power electronics including multiple output power converters modeling current and voltage mode control schemes and power semiconductor devices Provides comprehensive appendices to aid basic understanding of the fundamental circuits programming and simulation tools Contains a quick component

selection list of power MOSFETs and diodes together with their ratings important specifications and Spice models

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**Prescribed Textbook - English** Hussain Jeevakhan, 2021-11-01 1 Applied Physics II With Lab Manual by Hussain Jeevakhan 789391505578 DIP126EN Applied Physics II is a basic science course in the first year of the Diploma program in Engineering Technology Contents of this book are stringently aligned as per model curriculum of AICTE and incorporated with the concepts of outcomes based education OBE Book covers seven topics Wave motion Optics Electrostatics Current electricity Electromagnetism semiconductor physics and Modern physics Each topic and its subtopics are written from the perspective of a student's learning and in accord with the NEP 2020 guidelines Every unit comprises a set of activities and exercise at the end to assist the student's learning Some salient features of the book I Unit Outcomes of each unit are mapped with Course Outcomes and Programs Outcomes I Book Provides relevant interesting facts QR Code for E resources and use of ICT and suggested micro projects activities in each unit I Content presented in book in chronological way I Figures tables and equations are given to improve clarity of the topics I Solved examples are given with systematic steps I MCQ's short and long answer questions and unsolved problems of understanding and above levels Bloom's Taxonomy are given for learning reinforcement of students and as per OBE *Applied Physics-II (with Lab Manual)* Hussain Jeevakhan, 2021-01-01 Applied

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In a world used by monitors and the ceaseless chatter of instant communication, the melodic elegance and mental symphony created by the written term often disappear in to the backdrop, eclipsed by the persistent sound and interruptions that permeate our lives. Nevertheless, situated within the pages of **Half Wave Rectifier Lab Manual** a stunning literary treasure full of fresh emotions, lies an immersive symphony waiting to be embraced. Constructed by an outstanding composer of language, that fascinating masterpiece conducts visitors on a psychological journey, skillfully unraveling the concealed tunes and profound influence resonating within each carefully constructed phrase. Within the depths with this touching assessment, we will investigate the book is key harmonies, analyze its enthralling publishing style, and submit ourselves to the profound resonance that echoes in the depths of readers souls.

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