Experiment 4

Analysis of Half-Wave & Full-Wave Rectification

Objective:

To implement the half wave rectifier and full wave rectifier using 1N 4007 diode

Components Required:

4 Diodes

1 Resistors

Oscilloscope, Multimeter, Function generator

Circuit Diagram

Half Wave Rectifier

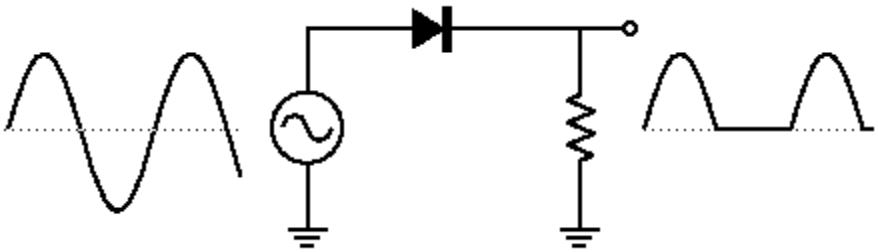


Figure 4.1: Half Wave Rectifier

Full Wave Bridge Rectifier

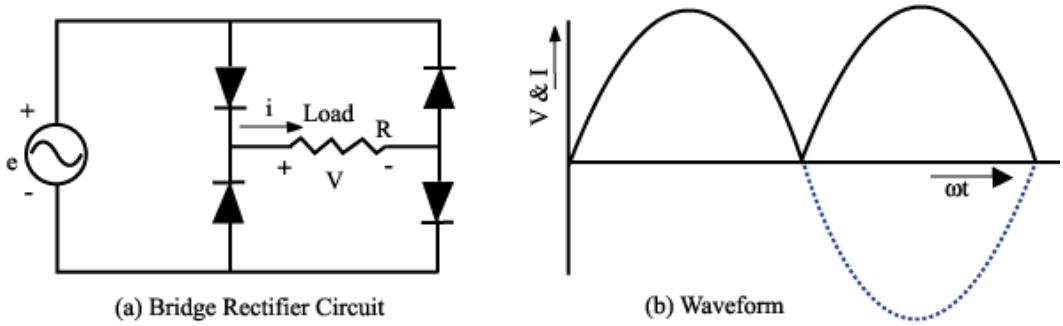


Figure 4.2: Full Wave Rectifier

THEORY:

A diode is using to pass current in a single direction. Alternating current is a current which flows in both directions. In some applications we need dc power supply. A method to obtain dc supply is by using batteries. But it is not economical at all times. It is possible to obtain dc from ac supply .That process is known as rectification. Rectification is of two types: 1.half wave rectification 2.full wave rectification

HALF WAVE RECTIFIERS:

In a half wave rectifier only one half cycle of ac voltage is taking. The circuit is given. Here only one diode is using. During the positive half cycle of ac voltage the diode conducts so current flows through load. During the negative half cycle, the diode is reverse biased .So no current flows through the diode. This type of rectification needs only one diode. But the efficiency is not as good as that of full wave rectifier

FULL WAVE RECTIFIERS:

Unlike a half wave rectifier, a full wave rectifier conducts in both half cycles of ac voltage.

FULL WAVE BRIDGE RECTIFIER:

In full wave bridge rectifiers 4 diodes are using. During positive half cycle, D1 and D4 are in forward biased condition. In the negative half cycle of ac D3 and D2 are in forward biased condition. So in both the half cycles current through the load is in single direction. Thus

rectification can be done. This circuit does not need a center tap rectifier. But it requires more number of diodes than center tap and half wave rectifiers.

PROCEDURE:

a) Construct the circuit of Fig.4.3 using the chosen diode of Part Record the measured value of the resistance R. set the function generator to 1000 Hz, 8 Vp-p sinusoidal voltages using the oscilloscope.

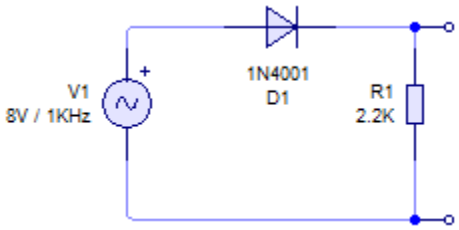


Figure 4.3: Half Wave Rectifier Circuit

Using the oscilloscope with the DC position, obtain the voltage V_O and sketch the waveform on Figure 4.4. Before viewing V_O be sure to set the V_O= 0 V line using the GND position of the coupling switch.

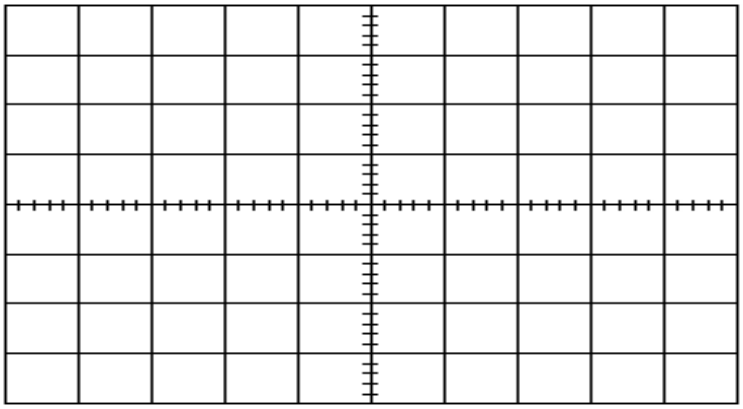


Figure 4.4: Half Wave Rectifier Output

b) Construct the full-wave bridge rectifier of Figure 4.5. Be sure that the diodes are inserted correctly and that the grounding is as shown.

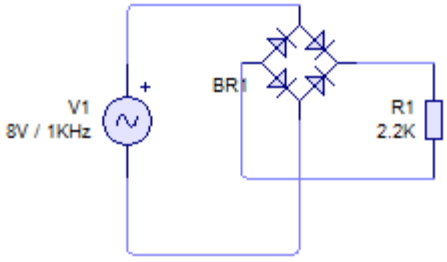


Figure 4.5: Half Wave Rectifier Circuit

Using the oscilloscope with the DC position, obtain the voltage V_O and sketch the waveform on Figure 4.6. Before viewing V_O be sure to set the V_O= 0 V line using the GND position of the coupling switch.

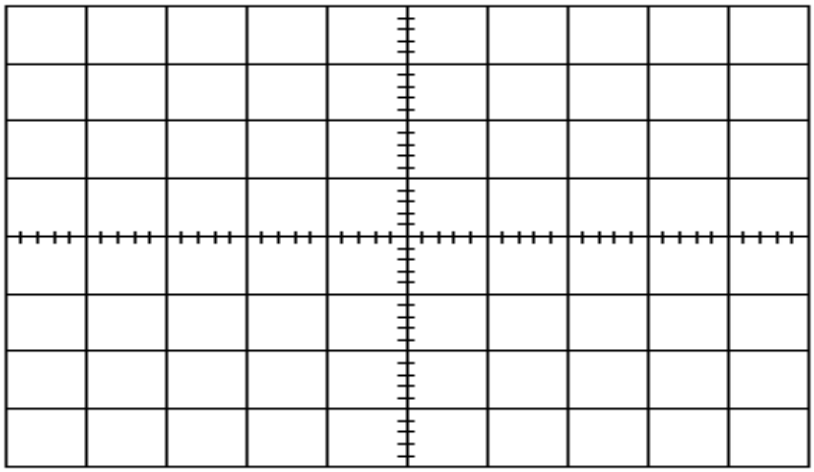


Figure 4.6: Full Wave Rectifier Output

Lab Exercise and Summary

Summary should cover Introduction, Procedure, Data Analysis and Evaluation.

Student's Signature: _____ **Date: _____**

LABORATORY SKILLS ASSESSMENT (Psychomotor)

Total Marks: 100

Criteria (Max Marks)	Level 1 0% ≤ S < 50%	Level 2 50% ≤ S< 70%	Level 3 70% ≤ S< 90%	Level 4 90%≤ S ≤100%	Score (S)
Procedural Awareness (20)	Selects inappropriate skills and/or strategies required by the task.	Selects and applies appropriate skills and/or strategies required by the task with major errors.	Selects and applies the appropriate strategies and/or skills specific to the task without significant errors.	Selects and applies appropriate strategies and/or skills specific to the task without any error.	
Practical Implementation (30)	Makes major critical errors in applying procedural knowledge related to Half-Wave & Full-Wave Rectification	Makes numerous critical errors in applying procedural knowledge related to Half-Wave & Full-Wave Rectification	Makes some non-critical errors in applying procedural knowledge related to Half-Wave & Full-Wave Rectification	Applies the procedural knowledge in optimized ways related to Half-Wave & Full-Wave Rectification	
Participation to Achieve Group Goals (10)	Shows little commitment to achieve group goals and fails to perform assigned roles.	Demonstrates commitment to achieve group goals, but has difficulty in performing assigned roles.	Demonstrates commitment to achieve group goals and carries out assigned roles effectively.	Actively helps to identify, achieve group goals and works effectively to meet them in all roles assumed.	
Interpersonal Skills in Group Work (10)	Rarely interacts positively within a group, even with prompting.	Interacts with other group members if prompted.	Interacts with all group members spontaneously.	Interacts positively with all group members and encourages such interaction in others.	
Use of Tool/Equipment (20)	Uses tools, equipment and materials with limited competence.	Uses tools, equipment and materials with some competence.	Uses tools, equipment and materials with considerable competence.	Uses tools, equipment and materials with a high degree of competence.	
Safety (10)	Requires constant reminders to follow safety procedures.	Requires some reminders to follow safety procedures.	Follows safety procedures with only minimal reminders.	Routinely follows safety procedures.	
				Marks Obtained	

Instructor Name: _____ **Sign: _____**

LABORATORY SKILLS ASSESSMENT (Affective)

Total Marks: 40

Criteria (Max. Marks)	Level 1 0% ≤ S < 50%	Level 2 50% ≤ S < 70%	Level 3 70% ≤ S < 90%	Level 4 90% ≤ S ≤ 100%	Score
Introduction (5)	Very little background information provided or information is incorrect	Introduction is brief with some minor mistakes	Introduction is nearly complete, missing some minor points	Introduction complete and well-written; provides all necessary background principles for the experiment	
Procedure (5)	Many stages of the procedure are not entered on the lab report.	Many stages of the procedure are entered on the lab report.	The procedure could be more efficiently designed but most stages of the procedure are entered on the lab report.	The procedure is well designed and all stages of the procedure are entered on the lab report.	
Data Record (10)	Data is brief and missing significant pieces of information.	Data provides some significant information and has few critical mistakes.	Data is almost complete but has some minor mistakes.	Data is complete and relevant. Tables with units are provided. Graphs are labeled. All questions are answered correctly.	
Data Analysis (10)	Data is presented in very unclear manner.	Data is presented in ways that are not clear enough.	Data is presented in ways that can be understood and interpreted.	Data is presented in ways that best facilitate understanding and interpretation.	
Report Quality (10)	Report contains many errors.	Report is somewhat organized with some spelling or grammatical errors.	Report is well organized and cohesive but contains some grammatical errors.	Report is well organized and cohesive and contains no grammatical errors. Presentation seems polished.	
				Marks Obtained	

LABORATORY SKILLS ASSESSMENT (Cognitive)

Total Marks: 10

(If any) **Marks Obtained**	

Instructor's Signature: _____ **Date: _____**