GOVERNMENT POLYTECHNIC COLLEGE

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DEPARTMENT OF COMPUTER ENGINEERING

A MICROPROJECT REPORT ON

"Full Wave (Bridge) Rectifier With C Filter"

For the partial fullfilment of Diploma in Computer Engineering,GP Pune.

Guided by

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Submitted by

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- **Title:**

  Full wave Rectifier (Bridge) with C filter

- **Resources Required:**

  1.Transformer : (230V to 12V)

  2.Diodes : Four

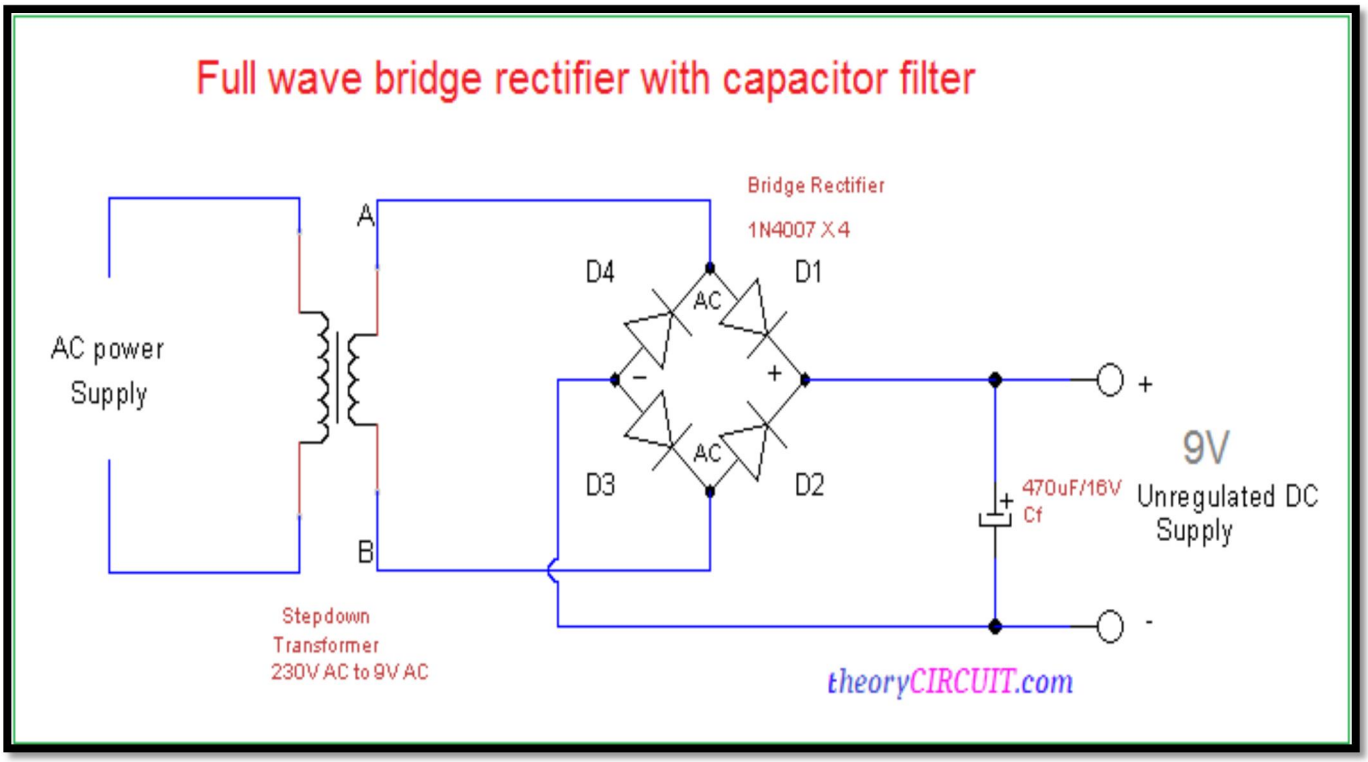
  3.Resistor : 1 kohm

  4.Connecting Wires

  5.PCB

  6.Multimeter (for testing output voltage)

- **Circuit Diagram:**



Procedure:

1. **Assemble the Circuit:**
   - Connect four diodes in a bridge configuration (D1, D2, D3, and D4) as shown in the diagram.
   - Connect the output of the bridge rectifier to a load resistor (100Ω) in series with the capacitor (1000μF) placed parallel to the load resistor.
   - Connect the AC input to the bridge rectifier, and ensure the correct polarity for the diodes.
   - Use an oscilloscope to monitor the waveform at the output of the bridge rectifier.
2. **Initial Test:**
   - Power on the AC supply to the circuit. Observe the rectified waveform using the oscilloscope.
   - Without the capacitor, the waveform should appear as a pulsating DC (rectified signal) that fluctuates between 0V and the peak value of the AC input.
3. **Add the Capacitor Filter:**
   - Insert the capacitor in parallel with the load resistor. This will filter out some of the ripple.
   - Observe the waveform again with the oscilloscope. The waveform should now appear smoother with reduced ripple, approximating a constant DC voltage.
4. **Measure the Output Voltage:**
   - Measure the DC output voltage across the load resistor using the multimeter.
   - Record the peak DC voltage and compare it with the expected output (approximately equal to the peak of the AC input voltage).
5. **Observe the Ripple:**
   - Measure the ripple voltage by observing the fluctuations in the output waveform on the oscilloscope. The ripple should be smaller after adding the capacitor filter.

Working:

1. **Full-Wave Bridge Rectifier:**
   - The AC input signal alternates between positive and negative half cycles.
   - During the **positive half cycle**, diodes **D1** and **D4** conduct, allowing current to flow through the load resistor in one direction.
   - During the **negative half cycle**, diodes **D2** and **D3** conduct, ensuring that the current still flows through the load resistor in the same direction.
   - This results in a pulsating DC output, where the current flows in only one direction but the voltage fluctuates between 0V and the peak AC voltage.
2. **Capacitor Filter:**
   - The capacitor **C** charges up to the peak value of the rectified output during each half cycle when the rectified voltage is above the capacitor's voltage.
   - When the rectified voltage drops below the capacitor's voltage, the capacitor discharges slightly, helping to maintain the output voltage and filling in the gaps.
   - This reduces the ripple in the output and provides a smoother DC voltage.

3. **Smoothing the Output:**
    - The capacitor reduces the fluctuations in the DC output voltage by providing charge during the "off" periods of the rectified waveform. This makes the output closer to a constant DC voltage, with a small ripple depending on the load and the size of the capacitor.

Observations:

- **Without the Capacitor:** The output voltage is pulsating DC. The voltage fluctuates between 0V and the peak value of the AC input, which means there is a high ripple.
- **With the Capacitor:** The output voltage is smoother. The capacitor charges to the peak voltage and helps to reduce the ripple, giving a more stable DC output.
- **Measured Output Voltage:** The DC output voltage should be approximately equal to the peak of the AC input. For an AC input of 120V RMS, the peak voltage would be Vpeak=120V×2≈170VV_{peak} = 120V \times \sqrt{2} \approx 170VVpeak =120V×2 ≈170V.
- **Ripple Voltage:** The ripple voltage depends on the size of the capacitor and the load resistance. With a 1000µF capacitor, the ripple should be significantly reduced, but there might still be minor fluctuations.

Results:

- **Input AC Voltage (RMS):** 120V
- **Peak AC Voltage:** 170V
- **Output DC Voltage (with filter):** Approximately 170V (with small ripple)
- **Ripple Voltage:** Measured using the oscilloscope, typically a few volts depending on the load and capacitor.

Conclusion:

- The **Full-Wave Bridge Rectifier** effectively converts AC into DC, utilizing both positive and negative half-cycles of the AC input.
- The **Capacitor Filter** significantly smooths the pulsating DC output by reducing the ripple, but it does not eliminate it completely.
- The output DC voltage is approximately equal to the peak AC voltage, with minor fluctuations depending on the filter capacitance and load.