Full Wave Center Tapped Rectifier

I. Aim

Study of a center tapped Full Wave Rectifier with Filter.

II. Theory

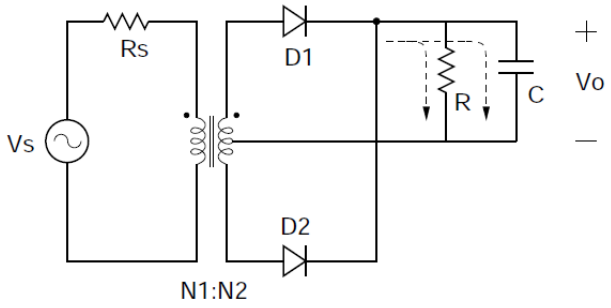

Figure 1

The circuit consists of a center-tapped transformer, followed by the rectifier formed by the two diodes D_1 and D_2, and finally the load R with a capacitor filter C. The circuit is designed such that the current through the load is always in the same direction during both the half cycles.

Assuming that the capacitor is discharged when the circuit is initially switched on. Due to the center tap rectifier, during the positive half cycle of the input V_s, diode D_1 will be forward biased and D_2 will be reverse biased and vice versa during the negative half cycle. Capacitor C will charge to the peak of the input waveform while the load R is being supplied current through D_1 . When the input starts to go below its peak value, the voltage across C will cause D_1 to be reverse biased, thus disconnecting the rectifier from the load. The capacitor will then provide the necessary current for the load. The rate of potential drop across C will be based on the values of R & C. During the negative half cycle, diode D_2 will initially be reverse biased due to voltage across C. When the voltage at the input crosses the dropping voltage across C, D_2 will be forward biased. Now the load is supplied current by the input while simultaneously charging C. This continues till the negative peak of the input waveform, after

which D_2 will be reverse biased. The next positive cycle is similar to the previous negative cycle with diode D_1 being forward biased when the input voltage crosses the voltage across C. Capacitor C ensures that the voltage across load R remains close to the peak of the input voltage. In the absence of C, the voltage across the load will change with the input voltage.