كلية الرشيد الجامعة

هندسة تقنيات الاجهزة الطبية

# ELECTRONIC CIRCUITS AND DEVICES

# Full-Wave Rectification

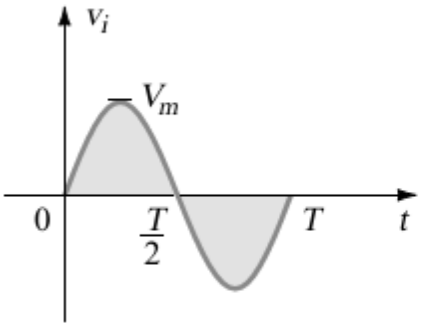
# (4)

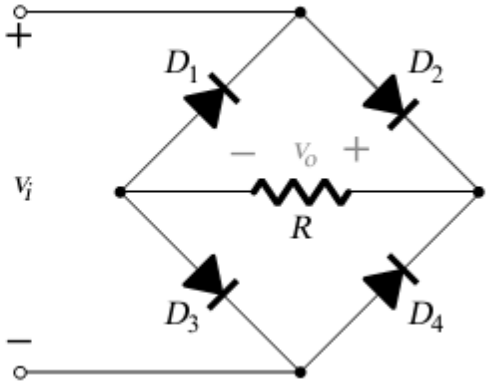
م.م. دينا جمال

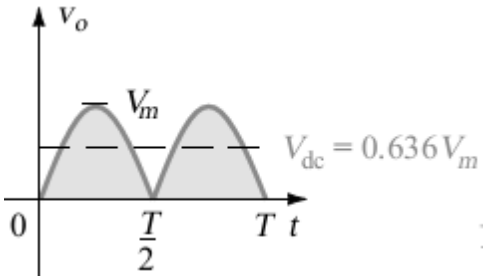
مرحلة ثانية

# Full-Wave Rectification:

**(a) Bridge Network:** The dc level obtained from a sinusoidal input can be improved 100% using a process called full-wave rectification. The most familiar network for performing such a function with its four diodes in a bridge configuration. During the period t = 0 to T/2 the polarity of the input is reveal that $D_2$ and $D_3$ are conducting while $D_1$ and $D_4$ are in the "off" state.



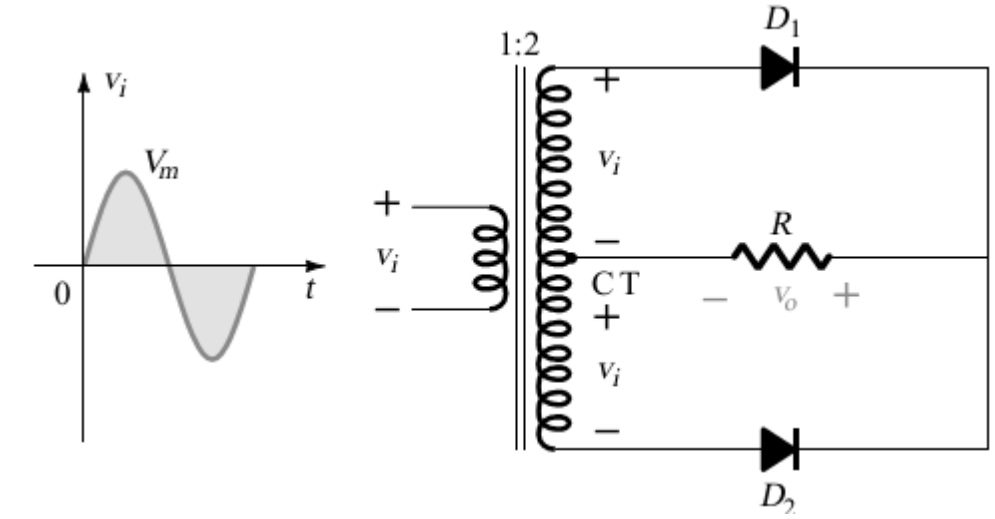

$V$dc=2(0.318$Vm$)=0.636$Vm$

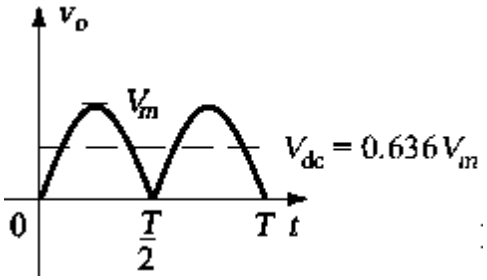
If silicon rather than ideal diodes are employed: $V_{dc} \cong 0.636(V_m - 2V_T)$

$PIVrating \geq V_m$ for Full-wave bridge rectifier

(b) **Center-Tapped Transformer:** A second popular full-wave rectifier with only two diodes but requiring a center-tapped (CT) transformer to establish the input signal across each section of the secondary of the transformer.

During the positive portion of $v_i$ applied to the primary of the transformer. D1 assumes the short-circuit equivalent and $D_2$ the open-circuit equivalent, as determined by the secondary voltages and the resulting current directions.

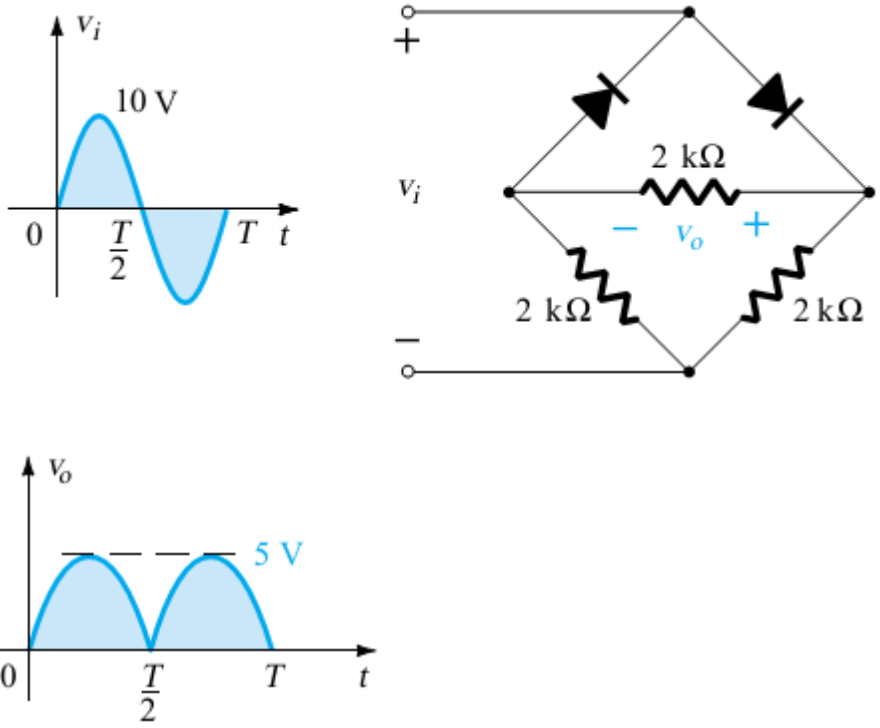



The net effect is the same output as that appearing in bridge rectifier with the same dc levels. $PIV = V_{Secondary} + V_R = V_m + V_m = 2V_m$

$PIV rating \geq 2V_m$ for Full-wave CT rectifier

***Example:*** *Determine the output waveform for the fallowing network and calculate the output dc level and the required PIV of each diode.*




$V\text{dc}=0.636Vm=0.636\times5=3.18V$

$PIVrating\geq V_m$ for Full-wave bridge rectifier, PIV=5V