



جامعة ساوة الاهلية

كلية التقنيات الهندسية

القسم: الفيزياء الطبية والعلاج الاشعاعي

المرحلة الثانية / الفصل الثاني

عنوان المحاضرة:

Full wave rectifiers circuits

رقم المحاضرة (4)

the fourth lecture

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ
IN THE NAME OF GOD, THE MOST
GRACIOUS, THE MOST MERCIFUL

**Department of Physics
and Radiotherapy**

(2) Full wave rectifiers circuits :

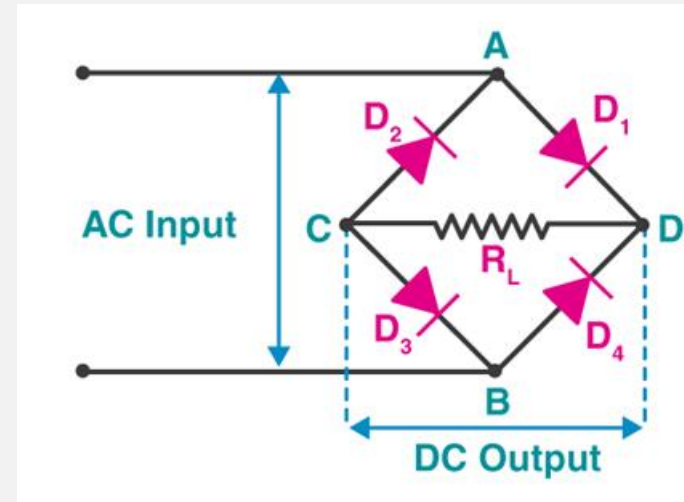
We are studied in previous lectures the half wave rectifier:

Now ,we will study the full wave rectifiers :

(I) bridge rectifier :

We can define bridge rectifiers as a type of full-wave rectifier that uses four or more diodes in a bridge circuit configuration to efficiently convert alternating (AC) current to a direct (DC) current . as shown in Fig (I6)

Fig (I6) bridge rectifier



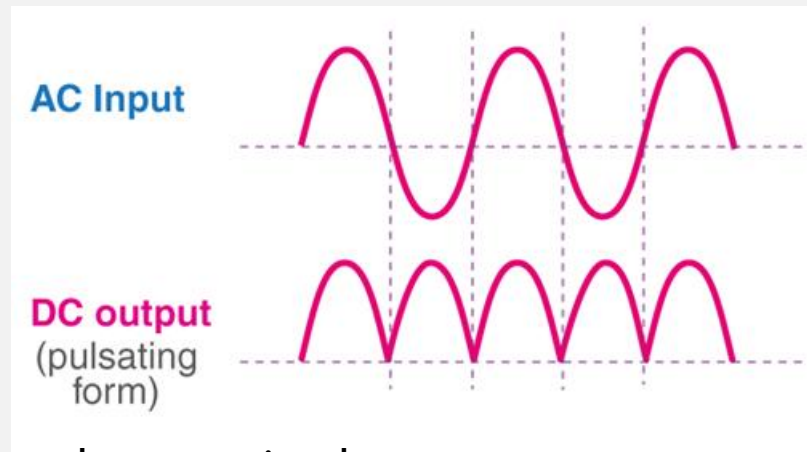


Fig (17) input and output signals

$$V_{DC} = V_{ave} = \frac{2V_p}{\pi} \quad \text{----- (8)}$$

$$(\text{peak inverse voltage}) (PIV) = V_M = \mathbf{V_{p2}} \quad \text{----- (9)}$$

$$F_{out} = 2F_{in} \quad \text{----- (10)}$$

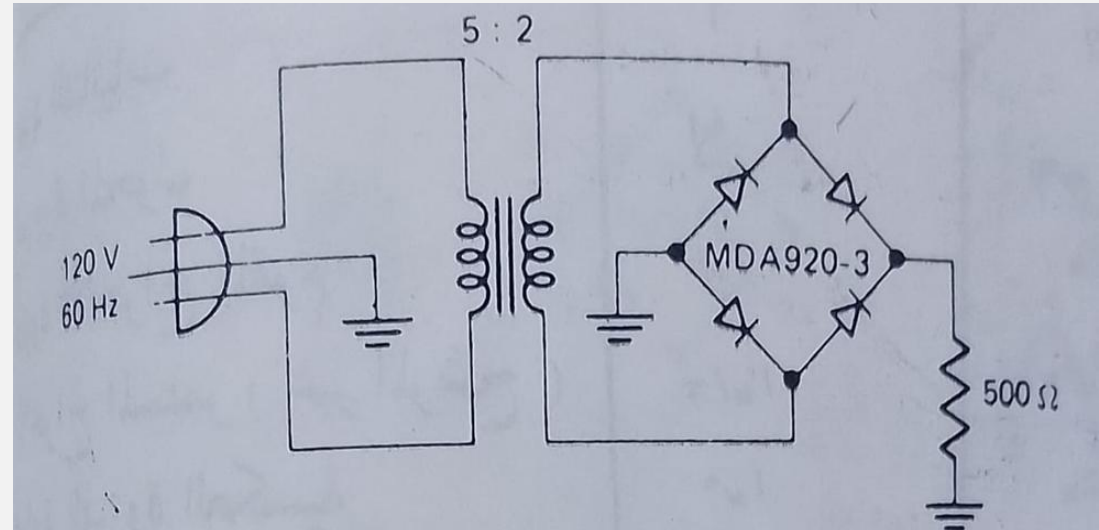
Example (3)

in the following figure the
voltage of secondary coil is
(68v) find

(1) $V_{d.c}$

(2) F_{out}

(3) (PIV)



Solution :

$$(1) V_{DC} = V_{ave} = \frac{2V_p}{\pi}$$
$$V_{DC} = V_{ave} = \frac{2 \times 68v}{3.14v} = 43.3v$$

(2) $F_{out} = 2F_{in} = 2 \times 60 \text{ Hz} = 120 \text{ Hz}$

(3) peak inverse voltage (PIV) $= V_M = 68 \text{ v}$

(2)Center Tapped Full Wave Rectifier

An electrical device that is used for converting alternating current (AC) to direct current (DC) is called a rectifier. one of these circuits center tap rectifier as show in figure (18) below:

$$V_{DC} = V_{ave} = \frac{2V_p}{\pi} \quad \text{----- (11)}$$

$$(\text{ peak inverse voltage) (PIV) } = 2V_M \quad \text{-----(12)}$$

$$F_{out} = 2F_{in} \quad \text{-----(13)}$$

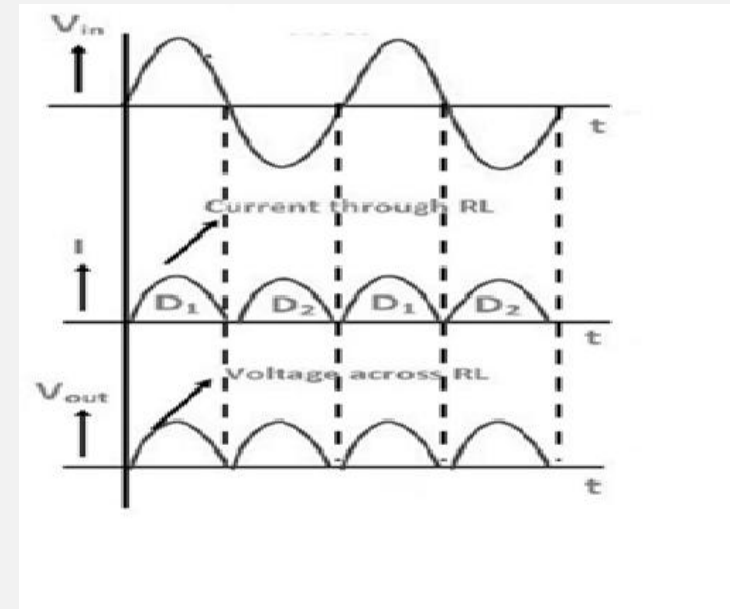
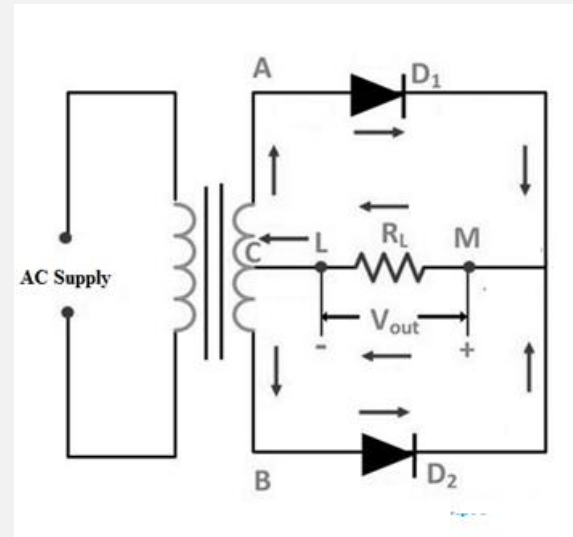


Fig.(18) center tap rectifier

example (4)

in the fig. shown below the voltage of the half of secondary coil is (28.3v) find:

- (1) output D.C voltage
- (2) f_{out} (output frequency)
- (3) peak inverse voltage

Solution :

$$V_{DC} = \frac{2 V_M}{\pi} = \frac{2 \times 28.3}{\pi} = 18 \text{ V}$$
$$f_{out} = 2 f_{in} = 2 \times 60 \text{ Hz} = 120 \text{ Hz}$$
$$PIV = 2 V_M = 2 \times 28.3 \text{ V} = 56.6 \text{ V}$$

Difference between Center Tapped Full Wave Rectifier Vs Bridge Rectifier

The difference between center tapped full wave rectifier and bridge rectifier includes the following.

Center Tapped Full Wave Rectifier	Bridge Rectifier
In center tapped FWR, two diodes are used.	In the bridge rectifier, four diodes are used.
Its Peak inverse voltage (PIV) is $2 V_s$ max.	Its Peak inverse voltage (PIV) is V_s max.
The transformer is used for center tapping.	The transformer is not required.
The voltage drop is less across the diode.	The voltage drop is high because of the four diodes.
The TUF (transformer utilization factor) is 0.691	The TUF (transformer utilization factor) is 0.814
Its voltage regulation is better.	Its voltage regulation is good.
It has less circuit complexity.	It has more circuit complexity.
These rectifiers are not economical as compared to the bridge rectifier.	These rectifiers are economical

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