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The device which operates at above 30V is called an electronic devices like transistors are used to amplify the analog signals, they eventually need DC voltage biasing to perform that task. Likewise so many electronic devices operate on only DC which cannot sustain any voltage changes. The DC sources like batteries can be used to power these electronic devices but the batteries will be drained with the time which provides interruption. In our electricity generation all the generated energy is alternating in nature, so this alternating energy should be converted in to direct energy to provide DC supply to the electronic components. This is an online process where the generated AC is converted into proper regulated DC. It is so important to learn the two devices called rectifiers and filters which are used to convert AC to DC. Rectifiers The device which converts alternating (bidirectional) voltage to pulsating (Unidirectional) voltage is called rectifier. As the name specifies it rectifies some portion of the alternating signal and provides a unidirectional signal at the output. This is achieved by the electronic element called semiconductor diode. The semiconductor diode is the element which allows the signal in one direction and blocks the signal in reverse direction i.e. converting bidirectional into unidirectional into unidirectional. Half Wave Rectifier However a simple diode can acts as rectifier which also can be called as Half wave rectifier. But the half wave rectifier which also can be called as Half wave rectifier can convert half of the input signal to pulsating DC and the remaining half will be lost as heat. So the efficiency is less. Full wave Rectifier To increase the efficiency two diodes are placed to convert each AC cycle into pulsating DC cycle. I.e. two unidirectional pulsed for one AC cycle will be produced at the output. The full wave rectifier and Bridge Full wave rectifier. AC signal in to half cycles and to give as an input to the two diodes which produces the pulsating DC. Bridge Rectifier Four rectifier diodes arranged in the form of bridge in which two diodes conducts per one half AC cycle and provides the pulsating DC. Bridge Rectifier Four rectifier diodes arranged in the form of bridge in which two diodes conducts per one half AC cycle and provides the pulsating DC. rectifier output is unidirectional pulsating current which has variation in magnitude. This variation in magnitude should be eliminated before giving to any electronic component. So to eliminate this, the devices called filters are introduced. Filters are introduced. Filters are introduced. Filters are introduced. the oscillations in the signal and provides a pure DC at the output. The electronic reactive elements like capacitor and inductors are used to do this work. Inductive Filter (L) The property of the inductor is that it opposes any sudden change in the magnitude of current with time. So the inductor offers some impendence (opposing force) for AC ((XL = jwL) and offers shot circuit for DC. So by connecting inductor in series with the supply blocks AC and allows DC to pass. Capacitor Filter The elegant quality of the capacitor is it stores the electrical energy for short time and discharges it. By controlling the charging and discharging rate of the capacitor the pure DC can be obtained from the pulsating DC. In simple the capacitor allows AC and blocks DC, so the capacitor the pure DC can be obtained from the pulsating DC. In simple the capacitor can connect parallel to the power supply so that the AC is filtered out and DC will reach the load. LC Filter In the above two filters the reactive components are singly connected, however no element will be perfect in doing the job i.e. inductor in series may pass small quantity of AC and Capacitor in parallel may not block all the AC components are connected as filter which provides less ripple factor at the output component to the above filter. CLC or π filter In L and LC filter the inductor connected in series to the power supply drops more AC voltage which reduces the efficiency. So to avoid this increase the efficiency a capacitor is connected at the input of inductor. Then the drop at the inductor is less and provides a ripple less DC which again filtered by capacitor at the output. Multiple connection the above filter provides better efficiency and less ripple factor at the output. A rectifier is an essential electronic device that converts alternating current (AC) into direct curr wave rectifiers, each with specific functions and characteristics. This article explores the purpose of rectifiers, and the advantages of each. Additionally, it covers the ripple factor, rectifier efficiency, and the importance of filter circuits in achieving a pure DC output. Rectifier: An electronic device that converts alternating current (AC) into direct current (DC) is called a rectifier. Functions of a Rectifier converts alternating current into direct current. Types: Rectifiers are mainly of two types:- Advertisement - 1) Half-Wave Rectifier. 2) Full-Wave Rectifier. The full-wave rectifier can be further divided into two types: 1) Full-Wave Center Tap Rectifier. Advantages The efficiency of a full-wave rectifier is higher than that of a half-wave rectifier is higher. The output voltage of a full-wave rectifier is higher than that of a half-wave rectifier. Both half cycles of AC are converted to DC in a full-wave rectifier. Distortion is less compared to half-wave rectifiers. Disadvantages A full-wave rectifier with a half-wave rectifier with a half-w The output current is lower. It requires only one diode. Its efficiency is low. The noise generated by this rectifier is rarely used. Full-Wave Rectifier is rarely used. Full-Wave Rectifier with a full-wave rectifier, both half cycles of the AC signal are converted to DC output. The output current is higher. It requires multiple diodes. Its efficiency is higher. This rectifier generates more noise. This type of rectifier generates more noise. The ratio of the RMS value of AC component to the DC component power output to the AC power input is called the efficiency of a rectifier. Rectifier Efficiency = DC power output / Input AC power The DC voltage we get from a rectifier is not pure DC. The circuit used to obtain pure DC is called a filter circuit. Types: Filter circuits are mainly of three types: 1) Parallel or Shunt Capacitor Filter. 2) Series Inductor Filter. 3) Inductor and Capacitor Filter circuits are mainly of three types: 1) Parallel or Shunt Capacitor Filter. 3) Inductor Filter. 4) Inductor Filter. 5) Inductor Filter. 6) Inductor Filter. 6) Inductor Filter. 8) Inductor Filter. the rectified output suitable for use in electronic circuits as needed. An example of a rectifier is a full-wave bridge rectifier, which converts the entire alternating current (AC) input into direct current (AC) inpu alternating current (AC) into direct current (DC). It is commonly used in power supplies for electronic devices, where DC is required for proper operation. A simple rectifier that uses a single diode to convert only one half of the AC cycle into DC. It is less efficient than a full-wave rectifier but easier to implement. There are two main types of rectifiers: Half-wave rectifier (which includes center-tap and bridge rectifier with a diagram typically refers to a circuit representation of how diodes are arranged to convert AC into DC. For example, a bridge rectifier uses four diodes in a square configuration to provide full-wave rectifier with a diagram typically refers to a circuit representation of how diodes are arranged to convert AC into DC. For example, a bridge rectifier uses four diodes in a square configuration to provide full-wave rectifier with a diagram typically refers to a circuit representation of how diodes are arranged to convert AC into DC. For example, a bridge rectifier uses four diodes in a square configuration to provide full-wave rectifier uses four diodes are arranged to convert AC into DC. For example, a bridge rectifier uses four diodes are arranged to convert AC into DC. called a diode because diodes are the key components used in rectifiers to allow current to flow in only one direction, which is how AC is converted to DC. No, a rectifier is not a switch. It is an electronic device that controls the flow of electrical current, specifically converting AC to DC. However, it operates similarly to a switch by only allowing current to flow in one direction. To make a rectifier, you need diodes (usually four in a bridge rectifier, use one diode, while for a full-wave rectifier is not a battery. While a battery stores DC power, a rectifier converts AC to DC. A rectifier provides DC output for various applications, whereas a battery is a source of stored DC energy. Rectifier is a pulsating DC, most electronic circuits require a substantially pure DC for proper operation. This type of output is provided by single or multisection filter circuits placed between the output of the rectifier and the load. There are four basic types of filter circuits: Simple capacitors, inductors, and/or resistors in various combinations. Inductors are used as series impedances to oppose the flow of alternating (pulsating DC) current. Capacitors are used as shunt elements to bypass the alternating components of the signal around the load (to ground). Resistors are used as shunt elements to bypass the alternating (pulsating DC) current. First, a capacitor opposes any change in voltage is called capacitive reactance (XC) and is measured in ohms. The capacitive reactance is determined by the frequency or capacitance is increased, the XC decreases. Filter capacitors are placed in parallel with the load. The capacitor acts as a short circuit for the AC component and thus better filtering than a high XC. Therefore, to obtain the best possible filtering, you want the capacitor to be as large as possible. Another consideration in filter circuits are the charge and the discharge paths (see the figure below). The other element to both the charge path (solid line in the figure) is the internal resistance of the power supply, while the other element of the discharge path (dashed line in the figure) is the resistance contains a resistance-capacitance circuit is defined as the time it takes a capacitor to charge to 63.2 percent of the applied voltage or to discharge to 36.8 percent of its total voltage. The time constant τ (RC time constant) can be expressed by the following equation: where R represents the capacitor is considered fully charged after five RC time constants. To obtain a steady DC output the capacitor must charge almost instantaneously to the value of applied voltage. The capacitor filter must have a short charge time constant. This can be accomplished by keeping the internal resistance of the power supply as small as possible. Once charged, the capacitor must retain the charge as long as possible. This can be accomplished by keeping the resistance of the load as large as possible (for a slow discharge time). Now let's look at inductor opposes any change in current through an inductor produces a changing electromagnetic field. The changing field, in turn, cuts the windings of the wire in the inductor and thereby produces a back electromotive force (BEMF). It is the BEMF that opposes the change in current at a given frequency is called inductive reactance (XL) and is measured in ohms. The inductor is determined by the applied frequency and the inductance of the inductor. Mathematically, If frequency or inductance is increased, the XL increases. Since inductors are placed in series with the load, the larger the XL, the smaller the AC voltage developed across the load. Now that you have read about the components in filter circuits, the different types of filter circuits will be discussed. The Capacitor Filter The simple capacitor filter is the most basic type of power supply filter. The capacitor (C) shown in the figure below is a simple capacitor filter connected across the output of the rectifier in parallel with the load. The value of the capacitor filter connected across the output of the rectifier with a capacitor filter. When this filter is used, the charge time of the filter capacitor (C) must be short and the discharge time must be long to eliminate ripple action. In other words, the capacitor must be long to eliminate ripple action. In other words, the capacitor must be long to eliminate ripple action. In other words, the capacitor must be long to eliminate ripple action. In other words, the capacitor must be long to eliminate ripple action. easier to filter than that of the half-wave rectifier because of its higher frequency. The rate of charge for the capacitor is limited by the resistance of the conducting diode which is relatively low. Therefore, the charge for the capacitor charges rapidly and almost reaches the peak value of the rectified voltage within the first few cycles. The capacitor slowly discharge to the peak value of the rectifier output falls to zero. (The capacitor cannot discharge immediately.) The capacitor slowly discharges through the load resistance (RL) during the time the rectifier is nonconducting. The rate of discharge of the capacitance and load-resistance values are large, the discharge time for the circuit is relatively long. Now, let's consider a complete cycle of operation using a half-wave rectifier, a capacitive filter (C), and a load resistor (RL). As shown in view A of the figure below, the capacitive filter (C) is assumed to be much greater than the reactance of C at the input frequency. When the circuit is energized, the diode conducts on the positive half cycle and current flows through the circuit, allowing C to charge to approximately the peak value of the input voltage is less than the peak value of the input voltage is less than the peak value of the input voltage is less than the peak value of the input voltage. (The charge to approximately the peak value of the input voltage is less than the peak value of the input voltage is less than the peak value of the input voltage is less than the peak value of the input voltage. line on the waveform. After the capacitor has charged to its peak value, it tends to retain its charge when the anode is considerably more rapid than the decrease of the capacitor voltage, the cathode quickly become more positive than the anode, and the diode ceases to conduct. The capacitor will start to discharge through the load resistor RL. Capacitor filter circuit. As illustrated in view B, the diode cannot conduct on the negative half cycle because the anode of D is negative with respect to the cathode. During this interval, C discharges through the load resistor (RL). The discharge of C produces the downward slope as indicated by the solid line on the waveform in view B. In contrast to the abrupt fall of the applied AC voltage from peak value to zero, the voltage across C (and thus across RL) during the discharge period gradually decreases until the time of the next half cycle of rectifier operation. Keep in mind that for good filtering, the filter capacitor should charge up as fast as possible and discharge as little as possible. Since practical values of C and RL ensure a more or less gradual decrease of the discharge voltage, a substantial charge remains on the capacitor at the time of the next half cycle of operation. As a result, no current can flow through the diode until the rising AC input voltage at the anode of the diode exceeds the voltage remaining on C. The voltage on C), the diode again conducts, and C begins to charge to approximately the peak value of the applied voltage. A comparison of a rectifier circuit with a capacitor and one without a capacitor is illustrated in view B of the figure above. With no capacitor connected across the output of the rectifier circuit, the output waveform (dashed line) has a large pulsating component (ripple) compared with the average or DC component (vavg = 0.318×Vpeak). When a capacitor is connected across the output, the average value of output voltage (Vavg) is increased and the ripple is decreased due to the filtering action of capacitor C. Operation of the simple capacitor filter using a full-wave rectifier is basically the same as that discussed for the half-wave rectifier. Referring to the figure below, you should notice that because one of the diodes is always conducting on either alternation, the filter capacitor charges and discharges during each half cycle. (Note that each diode conducts only for that portion of time when the peak secondary voltage is greater than the voltage across the capacitor filter). Another thing to keep in mind is that the ripple component (Vr) of the output voltage is an AC voltage and the average output voltage (Vavg) is the DC component of the output. Since the filter capacitor offers a relatively low impedance to AC, the majority of the AC component flows through the filter capacitor. component (or Vavg) flows through the load resistance. This statement can be clarified by using the formula for XC in a half-wave rectifier. Frequency at rectifier output: 60 Hz Capacitance of filter capacitor: 30 μF Load resistance: 10 kΩ The capacitive reactance Full-wave rectifier: Frequency at rectifier output: 120 Hz Capacitance of filter capacitor: 30 μF Load resistance of the capacitor by one-half. This allows the AC component to pass through the capacitor more easily. As a result, a full-wave rectifier output is much easier to filter than that of a half-wave rectifier. Remember, the better the filtering action. Since the largest possible capacitor will provide the best filtering. Remember, also, that the load resistance is an important consideration. If load resistance is made small, the load current increases, and the average value of the load current through the load current through the load current through the load current, the more rapid the discharge of the capacitor, and the lower the average value of output voltage. For this reason, the simple capacitive filter in conjunction with a full-wave (bridge) rectifier provides improved filtering because the increased ripple frequency decreases the capacitive reactance of the filter capacition. LC Choke-Input Filter is used primarily in power supplies where voltage regulation is important and where the output current is relatively high and subject to varying load conditions. This filter is used in high power applications such as those found in radars and communication transmitters. Notice in the figure below that this filter consists of an input inductor (C). Inductor is placed at the input to the filter capacitor (C). Inductor is placed at the input to the filter capacitor (C). inductor tends to keep a constant current flowing to the load throughout the complete cycle of the inductor (XL) reduces the amplitude of ripple voltage without reducing the DC output voltage by an appreciable amount. (The DC resistance of the inductor is usually just a few ohms.) The larger the value of the filter inductor, the better the filtering action. LC choke-input filter. The shunt capacitor (C) presents a low impedance to the ripple component existing at the output of the filter, and thus shunts the ripple component around the load. The capacitor attempts to hold the output voltage relatively constant. The value of the filter capacitor (C) must be relatively large to present a low opposition (XC) to the pulsating current and to store a substantial charge. The larger the value of the filter capacitor, the better the filter capacitor, the better the filter capacitor (E) must be relatively large to present a low opposition (XC) to the pulsating current and to store a substantial charge. value of the capacitor. Now look at the figure above which illustrates a complete cycle of operation for a full-wave rectifier circuit used to supply the input voltage at the output of the filter is the alternating component of the input voltage reduced in amplitude by the filter section. Each time the anode of a diode goes positive with respect to the cathode, the diode conducts and C charges. Conduction occurs twice during each cycle for a full-wave rectifier. For a 60-hertz supply, this produces a 120-hertz ripple voltage. Although the diode goes positive with respect to the cathode, and the diode goes positive with respect to the cathode, and the diode goes positive with respect to the cathode, and the diode goes positive with respect to the cathode, and the diode goes positive with respect to the cathode, and the input voltage is not steady. As the anode voltage of the conducting diode increases (on the positive half of the cycle), capacitor C charges - the charge being limited by the impedance of the secondary transformer winding, the diode's forward (anode-to-cathode) resistance, and the back electromotive force developed by the choke. During the nonconducting interval (when the anode voltage drops below the capacitor charge through the load resistor (RL). C will only partially discharge time constant τ (discharge time constant). As the charge time constant is normally short compared to the discharge time constant the capacitor C discharges more slowly than it charges. The filtering action is also illustrated in the figure below. The inductor (L) and the capacitor (C) form a voltage divider for the AC component is concerned, the inductor offers a high impedance (Z) and the capacitor offers a low impedance (view B). As a result, the ripple component (Vr) appearing across the load resistance is greatly attenuated (reduced). LC choke-input filter. Now that you have read how the LC choke-input filter functions, it will be discussed with actual component values applied. For simplicity, the input voltage at the primary of the transformer will be 117 volts 60 hertz. Both half-wave and full-wave rectifier circuits will be used to provide the input to the filter. Starting with the half-wave configuration shown in the figure below, the basic parameters are: With 117 volts AC (RMS value) applied to the Tr primary, 165 volts AC peak is available at the secondary (117 × 1.414 = 165 V). You should recall that the ripple frequency of this half-wave rectifier is 60 hertz. Therefore, the capacitor offers 265 ohms of opposition to the ripple current. Note, however, that the capacitor offers an infinite impedance to direct current. The inductive reactance of L is: The above calculation shows that L offers a relatively high opposition (3.8 kilohms) to the ripple in comparison to the opposition offered by C (265 ohms). Thus, more ripple voltage will be dropped across C. In other words, the ripple voltage appearing across the load resistance is attenuated. In addition, the impedance of C (265 ohms) is relatively low with respect to the resistance of the load. In other words, C shunts most of the AC component around the load. In other words, C shunts most of the AC component around the load. In other words, C shunts most of the AC component around the load. You can further increase the ripple voltage across L by increasing the inductance. Now let's discuss the DC component of the applied voltage. Remember, a capacitor offers an infinite ( $\infty$ ) impedance to the flow of direct current. The DC component, therefore, must flow through RL and L. As far as the DC is concerned, the capacitor does not exist. The choke and the load are therefore in series with each other. The DC resistance of a filter choke is very low (can be about 50 ohms). Consequently, most of the DC component is developed across the load and a very small amount of the DC component in an LC choke-input filter. As you may have noticed, both the AC and the DC components flow through L. Because it is frequency sensitive, the choke provides a large resistance to AC and a small resista in the figure below. This is due to the decrease in the XC of the filter capacitor and the increase in the XL of the choke. Remember, ripple frequency of a full-wave rectifier is twice that of a half-wave rectifier with an LC choke. input filter. When the XC of a filter capacitor is decreased, it provides less opposition to the flow through the capacitor, the lower the flow through the capacitor, the lower the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor, the lower the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor, the lower the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased, it provides less opposition to the flow through the capacitor is decreased. and better filtering is obtained. Resistor-Capacitor (RC) Filters The single capacitor filter is suitable for many noncritical, low-current applications. However, when the load resistance is very low or when the percent of ripple must be held to an absolute minimum, the capacitor value required must be extremely large. While electrolytic capacitors are available in sizes up to 10 mF or greater, the large sizes are quite expensive. A more practical approach is to use a more sophisticated filter that can do the same job but that has lower capacitor values, such as the RC filter. The RC capacitor-input filter is limited to applications in which the load current is small. This type of filter is used in power supplies where the load current is constant and voltage regulation is not necessary. The figure below shows an RC capacitor-input filter and associated waveforms. Both half-wave and full-wave rectifiers are used to provide the inputs. The average value of output voltage Vavg for the half-wave rectifier is less than half (approximately 0.318) the amplitude of the voltage peaks. The average value of output voltage for the full-wave rectifier is greater than half (approximately 0.637), but is still much less than, the peak amplitude of the rectifier-output waveform. With no filter circuit connected across the output of the rectifier circuit (unfiltered), the waveform has a large value of pulsating component (ripple) as compared to the average (or DC) component. RC filter and waveforms. The RC filter in the figure above consists of an input filter capacitor (C1), a series resistor (R1), and an output filter capacitor (C2). (This filter is sometimes referred to as an RC pi-section filter. It is used to reduce the percentage of ripple to a relatively low value (view B). This voltage is passed on to the R1-C2 network, which reduces the ripple even further. C2 offers an infinite impedance to the DC component of the output voltage is passed to the load, but reduced in value by the amount of the voltage by R1 is not a drawback. Component values are designed so that the resistance of R1 is much greater than the reactance (XC) of C2 at the ripple frequency. Therefore, most of the ripple woltage is dropped across R1. Only a trace of the ripple must be held to an absolute minimum, a second stage of RC filtering can be added. In practice, the second stage is rarely required. The RC filter is extremely popular because smaller capacitors can be used with good results. The RC filter has some disadvantages. First, the voltage away from the load. Second, power is wasted in R1 and is dissipated in the form of unwanted heat. Finally, if the load resistance changes, the voltage across the load will change. Even so, the advantages of the RC filter overshadow these disadvantages in many cases. LC Capacitor-Input filter is one of the most commonly used filters. This type of filter is used in any type of power supply where the output current is low and the load current is relatively constant. The figure below shows an LC capacitor-input filter and associated waveforms, which are similar to the case of RC filter shown in view A of the figure represent the unfiltered output from a typical rectifier circuit. Note that the average value of output voltage (Vavg) for the half-wave rectifier is less than half the amplitude of the rectifier output voltage for the full-wave rectifier is greater than half, but is still much less than the peak amplitude of the rectifier output voltage for the full-wave rectifier is greater than half the amplitude of the rectifier is greater than half, but is still much less than the peak amplitude of the rectifier output voltage for the full-wave rectifier is greater than half the amplitude of the rectifier output voltage for the full-wave rectifier is less than half the amplitude of the rectifier is greater than half, but is still much less than the peak amplitude of the rectifier output voltage for the full-wave rectifier is greater than half, but is still much less than the peak amplitude of the rectifier is greater than half, but is still much less than the peak amplitude of the voltage for the full-wave rectifier is greater than half, but is still much less than the peak amplitude of the rectifier is greater than half, but is still much less than the peak amplitude of the rectifier is greater than half, but is still much less than the peak amplitude of the rectifier is greater than half, but is still much less than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak amplitude of the rectifier is greater than the peak ampli (which results in unfiltered output voltage), the waveform has a large value of pulsating component (ripple) as compared to the average (or DC) component. LC filter, which reduces the ripple even further. L1 is a large value iron-core inductor (choke). L1 has a high value of inductance an therefore, a high reactance to AC ripple. L1 and C2 form an AC voltage divider and, because the reactance of L1 is much higher than that of C2, most of the ripple voltage is dropped across C1. Only a slight trace of ripple appears across C2 and the load (view C). While the L1-C2 network greatly reduces AC ripple it has little effect on DC. You should recall that an inductor offers no reactance to DC. The only opposition to current flow is the resistance of the wire in the choke. Generally, this resistance is very low and the DC voltage drop across the inductor is minimal. Thus, the LC filter overcomes the disadvantages of the RC filter provides good filtering action over a wide range of currents. Thus, the capacitor filters are best when the load is drawing little current. Thus, the capacitor filters are best when the load is drawing little current. Thus, the capacitor filters are best when the load is drawing little current. inductor filters are best when the current is highest. The complementary nature of these two components ensures that good filtering will occur over a wide range of currents. The LC filter has two disadvantages. First, it is more expensive than the RC filter because an iron-core choke costs more than a resistor. The second disadvantage is size. The iron-core choke is bulky and heavy, a fact which may render the LC filter unsuitable for many applications. 25992 Students Helped in Physics 102 Electricity and Magnetism "Numerade has a great goal - to increase people's educational levels all around the world. Educators do not complete student's personal homework tasks. We create video tutorials that may be used for many years in the future." Dr. Mei Lin Chen PhD in Physics 102 Electricity and Magnetism Electric circuits that convert AC to DC are known as rectifiers. Rectifiers are classified into two types as Half Wave Rectifiers are classified into two types as Half Wave Rectifiers. applications that need a smooth and steady supply. For a more smooth and steady supply, we use the full wave rectifier is defined as a rectifier that converts the complete cycle of alternating current into pulsating DC. Unlike halfwave rectifiers that utilize only the halfwave of the input AC cycle, full wave rectifier can be constructed in two ways. The first method uses a centre tapped transformer and two diodes. This arrangement is known as a centre tapped full wave rectifier. The second method uses a standard transformer with four diodes arranged as a bridge rectifier only. You can read our article on bridge rectifier to learn the construction and working of bridge rectifier in detail. The circuit of the full wave rectifier consists of a step-down transformer and two diodes that are connected and centre tapped. The output voltage is obtained across the connected and centre tapped. The output voltage is obtained across the connected and centre tapped. voltage AC into low voltage AC. The anode of the secondary winding becomes positive while the secondary winding becomes negative. During the positive half cycle, diode D1 is forward biased as it is connected to the bottom of the secondary winding. Due to this, diode D1 will conduct acting as a short circuit and D2 will not conduct acting as an open circuit During the negative half cycle, the diode D1 is reverse biased and the diode D2 is forward biased because the top half of the secondary circuit becomes positive and negative half cycle. Peak inverse voltage is the maximum voltage a diode can withstand in the reverse-biased  $calculated using the following formula: \\ \end{array}{1}I_{rms}=\frac{I_{max}}{2}\\ \end{array}{1}I_{rms}=\frac{I_{max}}{2}\\ \end{array}{1}I_{max}/{\pi}}=\frac{I_{max}}{2}\\ \end{array}{1}I_{max}/{\pi}$  $2\sqrt{2}=1.11\end{array}\)$  The following formula gives the peak factor of the full wave rectifier:  $(\end{array})\$  The rectification efficiency of the full-wave rectifier can be obtained using the following formula: (\begin{array}{l}\eta=\frac{DC\,Output\,Power}{AC\,Output\,Power} \end{array}\) The efficiency of full wave rectifiers is 81.2%. The rectifiers is 81.2%. The rectifiers is 81.2%. The rectifiers is 81.2%. full wave rectifiers is low hence a simple filter is required. The value of ripple factor in full wave rectifier is 0.482 while in half wave rectifier is 1.21. The output voltage and the output power obtained in full wave rectifier is that they need more circuit elements than the half wave rectifier which makes, making it costlier. Full wave rectifier so the input AC waveform to pulsating DC. A capacitor is used in the circuit to reduce the ripple factor. A centre tapped full wave rectifier that uses a centre tapped transformer and two diodes to convert the complete AC signal into DC signal into DC signal and offer double voltage is required to be rectifier is used in signal modulation and in electric welding. The full wave rectifiers are not suitable to use when a small voltage drop due to internal resistances. Stay tuned to BYJU'S and Fall in Love with Learning!

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