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**MECHATRONICS ENGINEERING**

**MCT 510 ASSIGNMNET**

1. **Differentiate between a controlled and Uncontrolled Rectifier**

The converter circuit which converts AC to DC is called a Rectifier. The rectifier circuit using diodes only are called Uncontrolled rectifier circuit. When SCRs (thyristor) are used to convert AC to DC, they have a controlled output voltage, so it is called a Controlled rectifier output. Unlike diodes, SCR does not become conducting immediately after its voltage has become positive.

1. **Differentiate between Single phase half- wave Rectifier and a Single-phase full wave Rectifier**

Half Wave and Full Wave Rectifiers are the two categories of rectifier circuits. The crucial difference between Half Wave and Full Wave Rectifier is that a half wave rectifier converts only one-half cycle of the ac input supplied into pulsating dc signal. As against a full wave, rectifier converts both halves of the applied input signal into pulsating dc.

Another major difference between the two is that the rectification efficiency of half wave rectifier is somewhat less as compared to the full wave rectifier.

1. **Explain the operational characteristics of a DIAC**

The DIAC is a two-terminal device; it is a combination of parallel semiconductor layers that allows activating in one direction. This device is used to activating device for the triac. The basic construction of diac consist of two terminals namely MT1 and MT2. When the MT1 terminal is designed positive with respect to the terminal MT2, the transmission will take place to the p-n-p-n structure that is another four-layer diode. The diac can be performing for both the direction. Then symbol of the diac look like a transistor.

The characteristics of a diac are as follows:

* Volt-ampere characteristic of a diac is shown in figure. Its looks like a letter Z due to symmetrical switching characteristics for each polarity of the applied voltage.
* The diac performs like an open circuit until its switching is exceeded. At that position the diac performs until its current decreases toward zero. Because of its abnormal construction, doesn’t switch sharply into a low voltage condition at a low current level like the triac or SCR, once it goes into transmission, the diac preserves an almost continuous negative resistance characteristic, that means, voltage reduces with the enlarge in current. This means that, unlike the triac and the SCR, the diac cannot be estimated to maintain a low voltage drop until its current falls below the level of holding current.
1. **Explain the operational characteristics of a TRIAC**

The triac is a three terminal device and the terminals of the triac are MT1, MT2 and Gate. Here the gate terminal is the control terminal. The flow of current in the triac is bidirectional that means current can flow in both the directions.

**Characteristics of TRIAC**

* The V-I characteristics of TRIAC are discussed below
* The triac is designed with two SCRs which are fabricated in the opposite direction in a crystal. Operating characteristics of triac in the 1st and 3rd quadrants are similar but for the direction of flow of current and applied voltage.
* The V-I characteristics of triac in the first and third quadrants are basically equal to those of an SCR in the first quadrant.
* It can be functioned with either positive or negative gate control voltage but in typical operation generally the gate voltage is positive in first quadrant and negative in third quadrant.
* The supply voltage of the triac to switch ON depends upon the gate current. This allows utilizing a triac to regulate AC power in a load from zero to full power in a smooth and permanent manner with no loss in the device control.