o Excessive flow of current may dimage the ducke in commit for say fittently tong cions may change if Circuit diagram is anosacros stab Holf wave Rectifier it was such (0-50mA) F004/11 Transformen

Rectifiers without filters.

. Aim: To study the half wave and full wave rectifier circuits without fifters

Apparatus

| v. Ammeter | 0-50 ma | |
|----------------------------|-----------------|-----------|
| 2. Digital multimeter | r VIII casinis | ser stale |
| 3. Decade resistance | 60x | -1 |
| Components 1. Diode IN4007 | 942 or 11/1 5/1 | o do que |

2. Transformer - 230 V/120 -12, 500mA

Theory of state gland are grirch short one Against Rectifien: A device, such as the semiconductor diode, which is capable of converting a sinusoidal input waveform (whose average value is zero) into a undirectional (though not constant) wave form with

a non-zero average component is cassed a rectifier.

The functions of various circuits are listed below:

1. Transformer: It adjusts the Ac level such that the approximate oc amplitute is achieved

2-Rectifien: A device, such as the semiconductor dio de, which is capable of converting input.

3. Filter: 'smoothes' the waveform by eliminating the AC component from the rectifier output.

Peak inverse voltage

The peak inverse voltage (PIV) or PRV (Peak revense voltage) rating of the diode is the primary importance of the design of rectification system. It is the vollage rating that must not exceeded in the reverse bias region of the diode.

In a halfwave rectifier, when the diode is revense biased, the voltage appears accross diode is 'Vi' and its maximum value is 'Vm . This Vm should not exceed the PIV of the diode otherwise the diode will enter into the breakdown region. for halfwave rectifien PIV rating > Vm.

Full wave Rectifien The circuit of the full wave rectifier is shown below This circuit is seen to comprises of two half-wave circuits connected so that conduction takes place and through one diode during one half eyele and through other diode boring the second half of the cycle

During the positive half cycle of the input signal D, is forward biased and in current flown through D, and R. During negative half cycle of the signal Pr is forward biased and is current flowing through o, and R. The current to load, which is the sum of these current, is i=i,+i2 the DC and RMS values of the toad current and load voltages are Ide = Average value

= Area of one cycle of current sivided by the paid fase of current

$$= -\frac{I_{m}}{\pi} (-2) = \frac{2I_{m}}{7}$$

where Im = Vm Vdc = Idc. Re = 2ImR2

m is the peak transformer secondary voltage from one end to the center tap.

rode hould diode

below ave

and ogh

lown

the

The dc output voltage of the foll wave rectified circuit is twice that for the half wave rectified circuit Because the anea above the axis for one full AC input cycle is twice that obtained for a half-wave system

$$T_{rms}^{2} = \frac{1}{\pi} \int_{0}^{\pi} T_{m}^{2} \sin^{2} d d = \frac{T_{m}^{2}}{\pi} \int_{0}^{\pi} \left(-\frac{\cos^{2} d}{2} \right) d d$$

$$= \frac{T_{m}^{2}}{2\pi} \left(\alpha - \frac{\sin^{2} \alpha}{\alpha} \right)_{0}^{\pi}$$

- zonitatosta - Losificani

$$= \frac{Im^2}{2}$$

$$I_{rms} = \frac{I_m}{\sqrt{2}}$$

Peak inverse Voltage

when any one of the two bodies is reverse biased the maximum voltage appears across that open circuit. This can be solved by following equivalent circuits.

By applying KVL we can find out VAB or VCD

Thus when any diode is reverse biased, then a maximum of 24m appears accross that diode For safe operation, the PIV rating of that diode should be greater that or equal to 24m

PIV > 2 Vm For center top transformer full wave rectifier.

Full wave rectifien gnput 5.20 Output the English types to the surprise of soplope synus mit - whatemit] to some Theoritical calculations: where any one of the two bodies is reverse biasely the maximum voltage appears across that open-Half wave rectifien bodos samo side diores VAG = V-0 - 8Vm. Thus when any diede is sevense blance then maximum of 24th appears accross that higher safe operation , are pry rating of that didde should be greater that or equal to sum FIV = 2 km for contents top transferance Coll wave rechiften Theoritical calculations:

Procedure

Half wave Rectifien

- 1- connect the circuit as shown
- 2. Give input from AC mains.
- 3. Now connect the DRB. Vory the DRB and note the values of Ide in steps of 10mA until the evrient reaches 100mA.

4. At each step measure the Voc and VAC values.

casculate ripple factor 'v' as ratio of Vocand VAC.

5. Observe the output waveforms on CRO.

Full wave Rectifier

- 1. Connect the circuit as shown
- z. Given input from Acmains.
- 3. Now connect the ORB. Vony the ORB and note the values of Ide in steps of 10mA until the current is reaching 100mA.
- 4. At each step measure the voc and vac values.

 calculate ripple factor cra as the ratio of vac to voc

 5. beserve the output waveforms on CRO.

Discussions

- D A rectifier is a device which converts alternating corrent into unidirectional corrent.
- exceeds PIV, then diode may get damaged.
- rectifier is not satisfactory to general power supply.
- so half wave rectifiers are not used in the OC power supply.

Model graphs Half wave rectifiens Full wave rectifier to a second topo sold sand the sand was incoming to distribute the thought Krist Wille more to you proved and show the same with the plant and sid designed on the dispress and liday wroted at 1-4322 16 at 18 colors a soline and see the second of to both as therespend dups a said supplied the the applied vellage in several placed continue expenses the war some may be designed rectified to not satisfactory to general perceive

Precautions

- 1. Never remove or insert a diode into a circuit with voltage applied.
- 2. When testing a diode, ensure that the test voltage did not exceed the diode maximum allowable voltage.
- 3. Ensure a replacement diode into a circuit was in the correct direction.
- 4. The correct connection of the transformer is made sure.

Result

wave forms of the half wave and full wave rectifiers without Filters are observed on CRO.