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ID 11473 25/4/20

Electronics Devices and circuits:

"Mid term."

Q1: a) what type of circuit is this?

Ans: This circuit is a ~~full~~ center-Tapped Full-wave Rectifier.

b) Peak secondary voltage:

Sol: Given data

turn ratio $n = 0.25$

Peak secondary voltage $V_{p(sec)} = nV_{p(Pri)}$

$= 0.25(50) = 12.5\ V$

There is ~~12.5V~~ 6.25 Peak across each half of the secondary with respect to ground. The out put load voltage has a peak value of 6.25 v, less the 0.7V drop across the diode

$PIV = 2V_{p(out)} + 0.7\ v = 2(5.5) + 0.7$

$\boxed{PIV = 11.8\ V}$

Q2 Determine the ripple factor for filtered bridge rectifier with a Load as indicated.

Ans: The transformer turn ratio n = 0.1

The Peak voltage is $V_P(rms) = 1.414\ V_{rms}$.

$$V_P \Rightarrow 1.414 \times 120 = 170\ V$$

The Peak secondary voltage

$$V_P(sec) = n\, V_{PL}(Pri)$$
$$= 0.1(170)$$
$$V_P(sec) = 17\ V$$

The unfiltered Peak full wave rectified voltage is

$$V_P(sec) = V_P(sec) - 1.4\ V = 170 - 1.4 = 15.6\ V = V_P$$

The freq of a full wave rectified voltage is 120 Hz. The approximate Peak to Peak voltage at output is

$$V_{r(PP)} = \left(\frac{1}{fRC}\right) V_P = \left(\frac{1}{(120\ Hz)(3300\ \Omega)(100\ \mu F)}\right) 15.6\ V$$

$$V_{r(PP)} = 2.77\ V$$

The approximate dc value of the output voltage is determine as follow.

$$V_{DC} = \left(1 - \frac{1}{2fR_{LC}}\right) V_P = \left(1 - \frac{1}{2(120)(3300)(100\ \mu F)}\right) 15.6\ V$$

$$V_{DC} = 82.544\ V$$

The resulting ripple factor is

$$\gamma = \frac{V_{r(PP)}}{V_{DC}} = \frac{2.777}{82.544} = 0.035$$

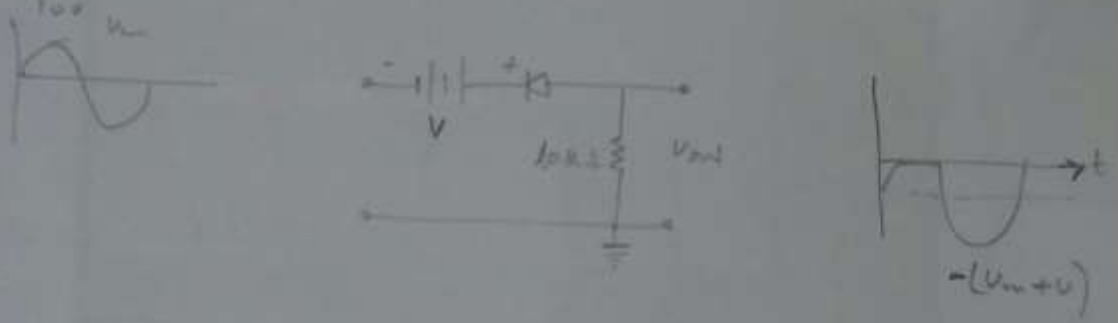
The percent ripple is 3.5%.

Q3 (3)

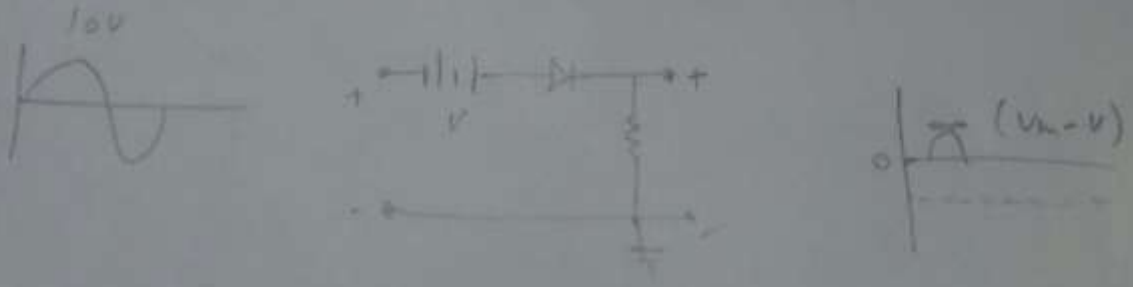
Determine the output voltage waveform for the circuit given

Sol:

For Positive cycle:- the

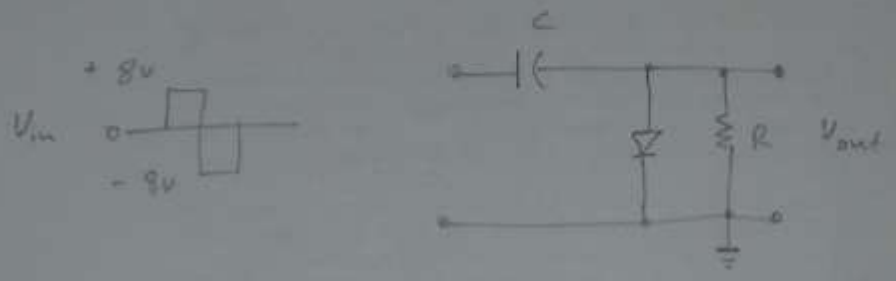


For Negative cycle:



(4)

Q4 Determine the output voltage waveform for the circuit given



output voltage waveform:

Q5 A) what is power supply filter?

Ans The ripple in the signal denotes the presence of some AC components This ac component has to be completly removed in order to get pure dc output. So we need a circuit that smoothens the rectified output into a pure dc signal.

A filter circuit is one which removes the Ac components present in the rectified output and allows the dc components to reach the load.

Q5 B How are n-type and P-type semiconductor formed.

Ans: Two types of impurities are n-type and P-type:

N-type : The addition of Pentavalent impurities such as antimony, arsenic or phosphorous contributes free electrons, greatly increasing the conductivity of the intrinsic semiconductor.

Qs B

P-type Semiconductor: (5)

The addition of trivalent impurities such as boron, aluminum or gallium to an intrinsic semiconductor creates deficiences of valence electrons, called "holes". It is typical to use B_2H_6 diborane gas to diffuse boron into the silicon material.

Qs C what is diode limiter?

Ans: Diode circuits, called limiters or clippers are sometimes used to clip off portions of signal voltages above or below certain levels.

The difference between positive limiter and negative limiter is that.

Diode positive limiter that limits or clips the positive part of the input voltage. As the input voltage goes positive, the diode becomes forward biased and conducts currents.

Diode negative limiter that limits or clips the negative part of the input voltage. when the input voltage goes back below 0.7v the diode is reverse baised.

Q5 d. What component act as a battery in a clamping circuit.

Ans: Capacitor acts as a battery in a clamping circuit.

Q5 e. When a 60 Hz sinusoidal voltage is applied to the input of a half-wave rectifier, what is the output frequency?

Ans: When a 60 Hz sinusoidal voltage is applied to the input of a half-wave rectifier the output frequency will be 120 Hz.

Q5 f: If the load resistance connected to a filtered power supply is decreased, what happens to the ripple voltage?

Ans. If the load resistance connected to a filter power supply is decreased Voltage across the load will be large capacitor reduce the ripples of voltage across the load.

Q5 g: Discuss how diode limiters and diode clampers differ in term of their function.

Ans: The major difference between clipper and clamper is that clipper is a limiting circuit which limits the output voltage while clamper is a circuit which shifts the DC level of output voltage. The clipper and clamper circuits are exactly opposite to each other regarding their working principal.

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