Assignment-3

Full Marks: 50

Q1.

The input of a full-wave rectifier is expressed by, Vs(t)= 7sin(400πt), and output load resistance is R = 5 kΩ. Silicon diodes are used in this circuit for which the forward drop is V_{D0} = 0.3 V.

a. **Calculate** the input and output wave frequency.
b. **Show** the input and output waveforms.
c. **Calculate** the DC value of the output voltage.

Now after connecting a capacitor, C= 100 µF in parallel with the load.

d. **Calculate** the peak-to-peak ripple voltage,
e. **Calculate** the average of the output voltage V_{DC} after connecting the capacitor. Compare this with the DC value determined in 'c' and comment on the difference between these two.
f. How can you provide better filtering for the output waves?
g. **What** is the frequency of the Ripple voltage?

Q2.

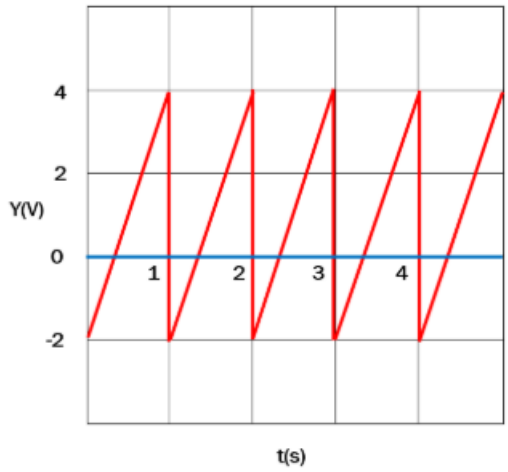
A voltage waveform V_i = 10sin(100πt) V is fed into a full-wave (FW) rectifier with a load resistance R = 10 KΩ . A capacitor is also connected with the load to reduce the fluctuation of the output voltage. It produces a peak to peak ripple voltage which is 3% of the peak output voltage . The diodes have a forward voltage drop of V_{DO} = 0.8 V .

a. **Draw** the rectifier circuit .
b. **Determine** the peak output voltage V_P , and the peak to peak ripple voltage $V_{r(p-p)}$.
c. **Calculate** the average (DC) value of the output voltage.
d. **Estimate** the value of the capacitor from the given data.

Q3.

a. Consider a half-wave rectifier circuit with a triangular-wave input of 5-V peak-to-peak amplitude with *R* = 1 kΩ. Assume that the diode can be represented by the constant-voltage-drop model with V_{DO}= 0.7 V. **Draw** the input and output waveform with proper label.

b.



The input of a half-wave rectifier is exhibited in the figure above and the output load is R = 5 KΩ. Silicon diodes are used in this circuit for which the forward drop is V_{D0} = 0.7 V.

I. **Show** the input and output waveforms.
II. **Draw** the VTC curve

Q4.

a. The input of a Half-wave rectifier is a Square wave voltage with peak V_M= 15 V and frequency 0.5 Hz, and output load resistance is R = 5 kΩ. Silicon diodes are used in this circuit for which the forward drop is V_{D0} = 1 V.

I. **Show** the input and output waveforms.
II. **Draw** the VTC curve

b. The input of a **full-wave rectifier** is a **Square** wave voltage with peak V_M= 15 V and frequency 0.5 Hz, and output load resistance is R = 5 kΩ. Silicon diodes are used in this circuit for which the forward drop is V_{D0} = 0.7 V.

I. **Show** the input and output waveforms.
II. **Draw** the VTC curve

Q5.

Consider a full wave rectifier with a load resistance of R = 10 kΩ and a capacitor of 8 µF connected in parallel with the load . The rectifier is fed by an input V_i . The average current flowing through the load is 0.75 mA and the output frequency is 100 Hz. [assume V_{DO} = 1V for each diode]

a. **Draw** the rectifier circuit.
b. **Determine** the equation of the input waveform V_i .
c. **Show** the input and output waveforms with proper labeling