

## Assignment-3

Full Marks: 50

### Q1.

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

- Calculate** the input and output wave frequency.
- Show** the input and output waveforms.
- Calculate** the DC value of the output voltage.

Now after connecting a capacitor,  $C = 100\text{ }\mu\text{F}$  in parallel with the load.

- Calculate** the peak-to-peak ripple voltage,
- 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.
- How can you provide better filtering for the output waves?
- What** is the frequency of the Ripple voltage?

### Q2.

A voltage waveform  $V_i = 10\sin(100\pi t)\text{ V}$  is fed into a full-wave (FW) rectifier with a load resistance  $R = 10\text{ k}\Omega$ . 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  $V_{D0} = 0.8\text{ V}$ .

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

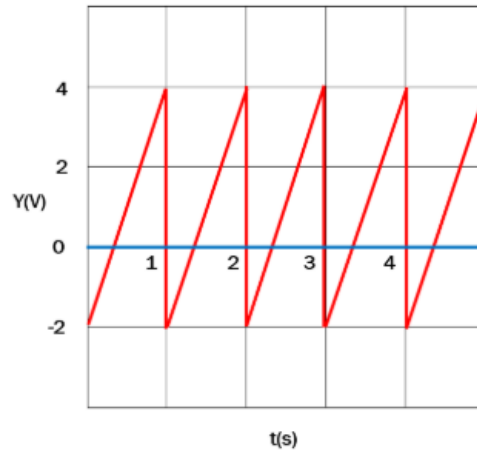
### Q3.

Consider a full wave rectifier with a load resistance of  $R = 10\text{ k}\Omega$  and a capacitor of  $8\text{ }\mu\text{F}$  connected in parallel with the load. The rectifier is fed by an input  $V_i$ . The average current flowing through the load is  $0.75\text{ mA}$  and the output frequency is  $100\text{ Hz}$ . [assume  $V_{D0} = 1\text{ V}$  for each diode]

- Draw** the rectifier circuit.
- Determine** the equation of the input waveform  $V_i$ .
- Show** the input and output waveforms with proper labeling

Q4.

a.



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

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

b. Plot  $V_O$  for the input shown in figure-1 [assume  $V_{D0} = 1 \text{ V}$ ]

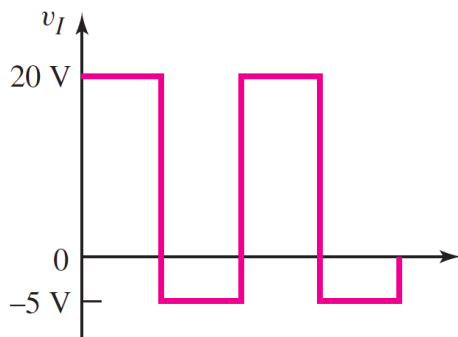
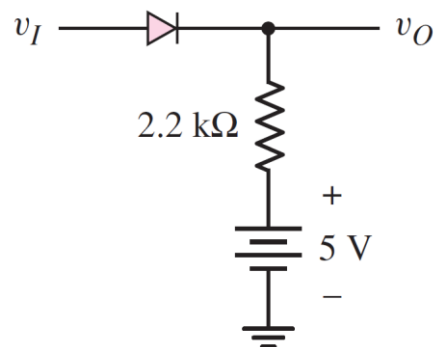


Figure-1



Circuit-1

Q5. If a triangular waveform shown in figure-2 is applied, plot the output waveform for each circuit.  
[assume  $V_{D0} = 1 \text{ V}$ ]

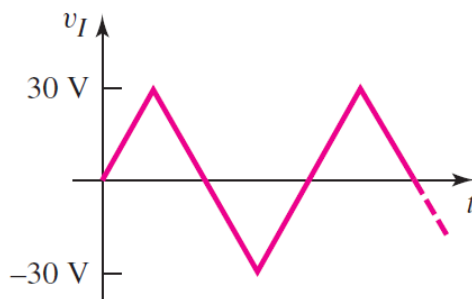
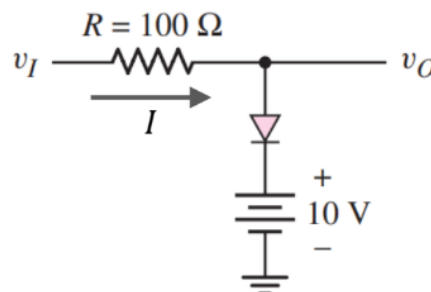
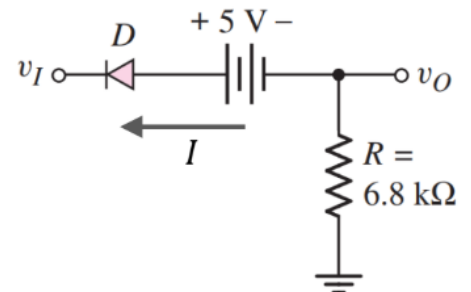


Figure-2



Circuit-2



Circuit-3