Q1: A voltage of $V(t)$=100 Cos ($2\pi 60t$) is applied to a non-linear load. The resulting current is expressed in Fourier series as,

$i(t)$=15 Cos ($2\pi 60t$+35°) + 6 Cos ($4\pi 60t$+15°) + Cos ($8\pi 60t$−10°)

Find,
a) RMS voltage and current.
b) Power absorbed by load.
c) Power factor of load.
d) THD in load current. **(15 %)**

Q2: Figure 2 shows a rectifier with resistive load.

a. Sketch the waveform of the output voltage.
b. Sketch the waveform of the SCR voltage.
c. Find the average value of the output voltage. **(15 %)**

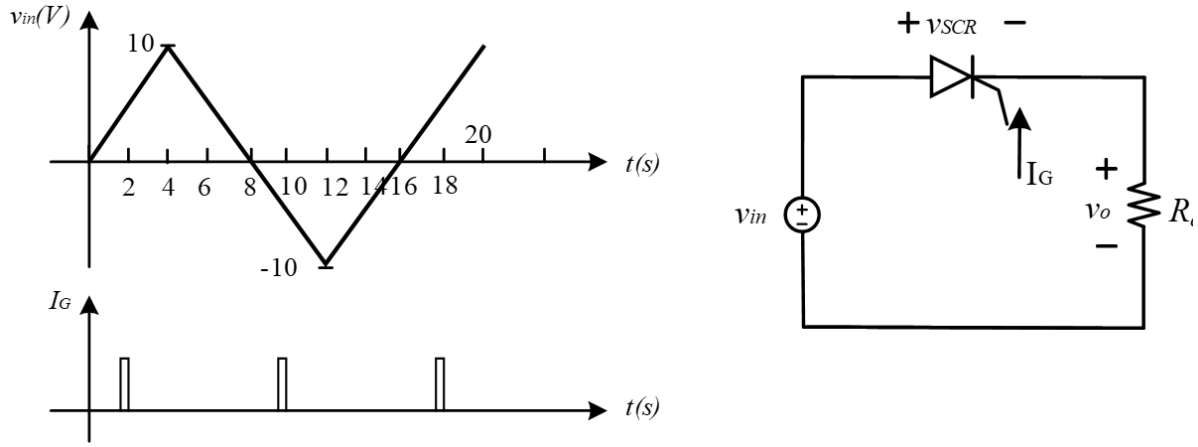

Figure 2

Q3. For the boost converter depicted in the Figure 3, L=2mH, R=4Ω, V_s=37V, V_o=61V, and T_{ON}=1ms. Find:

a. the duty cycle
b. the switching frequency
c. input source current and the output load current when switch was set on 'ON' position
d. Sketch the waveform for the current flown through the switch and the diode. **(20 %)**

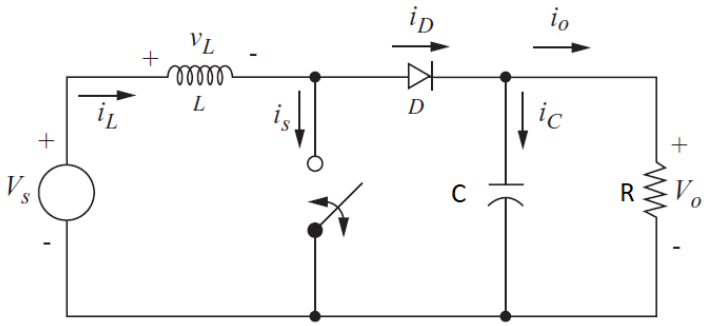

Figure 3

Q4: The reference and currier signals of a single-phase inverter with bipolar switching scheme are depicted in Figure 4.

a. What value has been used for m_f?
b. If Vin=100 V, accurately plot the waveform of the output voltage.
c. Find the rms value of the output voltage. **(15 %)**

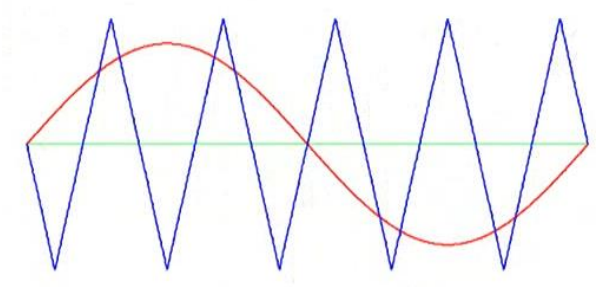

Figure 4

Q5. Figure 5 shows operation of a full-bridge inverter with R-L load in steady state operating condition.

a. What is the main reason for using the antiparallel diode?
b. Sketch the current waveform for the first diode (D1) and the first transistor (Q1). **(10%)**

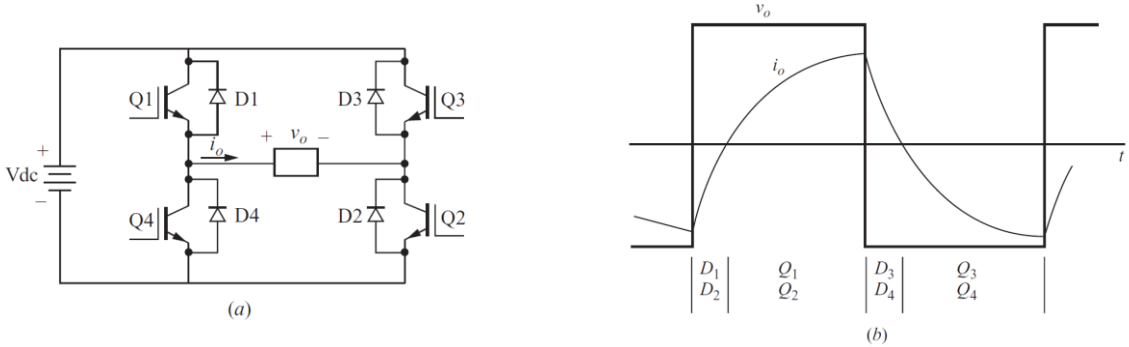

Figure 5