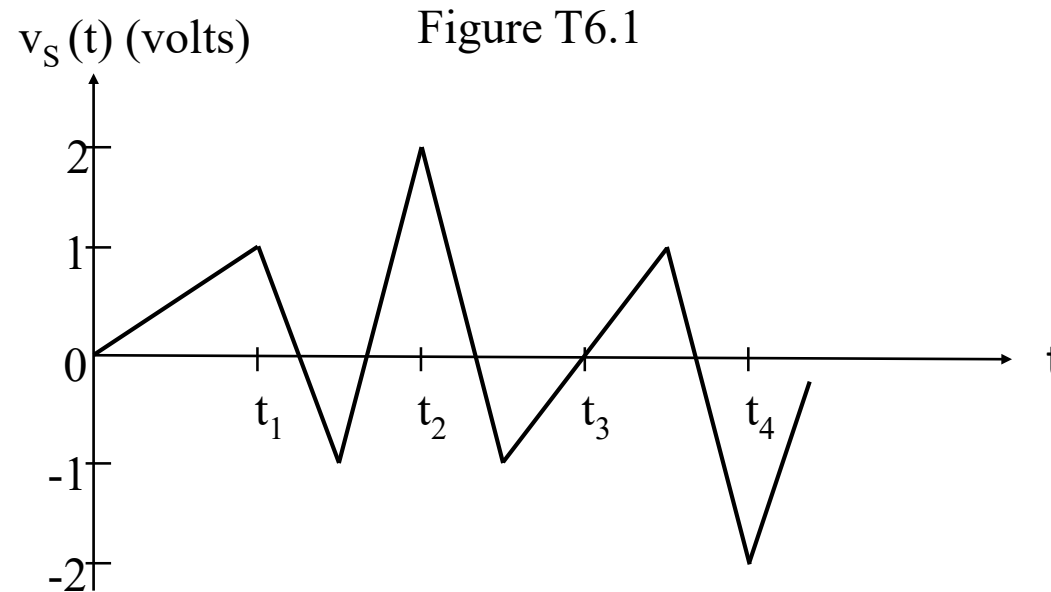1. An FM modulator has a conversion gain of 10 kHz/V. Its carrier frequency is set to 200 kHz.
   Plot a graph showing how the output frequency changes when the modulating signal in Figure T9.1 is applied.
   Indicate the frequency at t_1, t_2, t_3 and t_4.

v_S (t) (volts)   Figure T6.1

Guided Solution

1. Relate the modulator output frequency with the modulating signal: $f_i(t) = f_c + k_f v_s(t)$
2. Draw the pattern in which the modulator output frequency changes based on the relation find in step 1.
3. Determine the frequencies at time at 0, t_1, t_2, t_3 and t_4 using $f_i(t) = f_c + k_f v_s(t)$
4. Complete the pattern by filling in the frequency values obtained in step 3.

3. A 100 MHz carrier is frequency modulated by a 5 kHz sine wave to a modulation index of 4. Given that the conversion gain of the demodulator is 6 mV/kH. Determine the peak output voltage of the demodulator.

Guided Solution

1. Find the peak frequency deviation Δ_f based modulation index.
2. Identify the relationship between the peak output voltage of the demodulator and the peak frequency deviation Δ_f.
3. Calculate the peak output voltage of the demodulator based on the finding in step 2.