Arab Academy for Science, Technology and Maritime Transport
College of Engineering and Technology
Department : Electronics and Communications
Course : Electronic Measurements   **Course Code:** EC410
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Problem Set #6
Signal Analyzers

1- A sinusoidal signal is applied to a circuit that introduces the second, fourth and sixth harmonics. If the amplitude of the primary signal has a rms value of 6 V and the second, fourth and sixth harmonics have rms of .3 V, 0.2 V and 0.1 V respectively. What is the total harmonic distortion (THD). If the output of this circuit is applied to a spectrum analyzer, sketch what will be shown on its screen.

2- A sinusoidal signal is applied to a circuit that introduces the third, fifth and seventh harmonics. If the input signal has a period of 5 ms. What frequencies are present in the output signal.

3- The total harmonic content of a signal is 10% and contains only the fundamental, third, fifth and seventh harmonics. If the rms values of third=1 V, fifth=0.7 V and seventh=0.15 V. What is the rms value of the fundamental frequency. Sketch the displayed waveform on a spectrum analyzer.

4- In a voltage tunable BPF, the step voltage of 2 mV corresponds to change in BPF center frequency of 10 KHz. Find the voltage peak of the sweep generator to sweep the output from 10 MHz to 80 MHz. Consider the frequency 10 MHz is corresponding to 5 V.

5- Find the THD and the distortion factor up to the 4th component generated in a signal generator given that the fundamental component is 21.21 mv, the rms of the second harmonic is 1.4 mv and the amplitude of a given harmonic is less than the previous one- by 200 μv.

6- A signal with a single harmonic distortion is displayed on an oscilloscope as shown. The oscilloscope TIME/DIV control is set to $10\,ms$ and its VOLTS/DIV control is set to 20 mv. Determine (i) the order of the harmonic, (ii) the fundamental and harmonic frequencies, (iii) the rms values of the harmonic and the waveform, and (iiii) the THD.