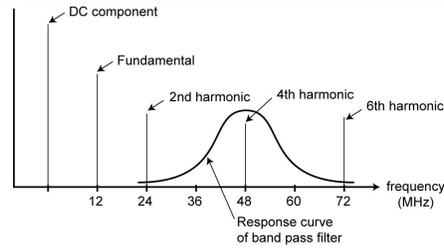


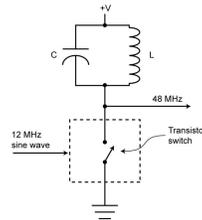
## Frequency Domain View of Electronic Signals: Practical Application of the Fourier Theory

Objectives: Applications of the Fourier Theory

1. Identify ways to use the Fourier theory in testing and troubleshooting.
  2. Identify how various electronic components are used in circuits.
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1. True or False: Time domain explanations track voltage and current changes over time such as the charging and discharging of capacitors, the induction of voltages in inductors and transformers, and the variation of currents in semiconductors.
  2. What is a power supply?
    - a. Circuit that converts the AC power line voltage into one or more DC voltages
    - b. Circuit that converts the DC power line voltage into one or more AC voltages
    - c. Circuit that generates an AC voltage
    - d. Circuit that produces a higher output from a lower input
  3. In a power supply, a \_\_\_\_\_ is used to either steps up or step down the voltage.
    - a. Diode
    - b. Rectifier
    - c. Regulator
    - d. Transformer
  4. \_\_\_\_\_ are used in a \_\_\_\_\_ to convert the AC sine wave into DC pulses.
    - a. Diode, filter
    - b. Diodes, rectifier
    - c. Filter, rectifier
    - d. Rectifier, regulator
  5. The capacitor discharges into the load between the pulse peaks to
    - a. Achieve higher output frequencies from lower frequency input
    - b. Convert the AC sine wave into DC pulses
    - c. Help keep the voltage from changing
    - d. Produce an output as some integer multiple of the input frequency
  6. A frequency multiplier is a circuit that takes the \_\_\_\_\_ as the input but produces an output as some integer multiple of the input frequency.
    - a. Fundamental frequency
    - b. Harmonic
    - c. Resonant circuit



7. This figure represents a selective band pass filter which is tuned to 48 MHz. Which harmonic is passed?
- The filter passes only the 48 MHz harmonic and attenuates the fundamental and all other harmonics.
  - The filter passes only the fundamental and harmonics below the 4<sup>th</sup> (48 MHz).
  - The filter passes only the fundamental.
  - The filter passes only the harmonics above the 4<sup>th</sup> (48 MHz).
8. Most cables act as \_\_\_\_\_ and, as a result, naturally \_\_\_\_\_ the higher harmonics. As a result, the cable \_\_\_\_\_ the binary signal applied to its input.
- Binary pulse trains, amplify, distorts
  - High pass filters, attenuate, distorts
  - Low pass filters, amplify, filters
  - Low pass filters, attenuate, distorts



9. What type of multiplier is the circuit shown?
- Frequency doubler
  - Frequency quadrupler
  - Frequency tripler
10. What characteristic of a cable has the greatest effect on the cut-off frequency?
- Capacitance
  - Inductance
  - Length
  - Resistance
11. In order to pass the signal with minimum distortion and maintain the rise and fall times, a cable should have a minimum cut-off frequency of \_\_\_\_\_.
- $1/\tau$
  - $\tau$
  - $\tau(bw)$
  - $bw - \tau$