

19-4-2022

Measurements and Instrumentations for TLCs.

Answer the following questions in an explanatory way to prove your knowledge of the different matters.

- 1) Draw the scheme and derive the input/output characteristic of an analog circuit based on operational amplifiers suitable for doing the sum of two signals. In case the design signal bandwidth is equal to 10 kHz define the essential specification of the operational amplifiers to be used.
- 2) Draw the block schematic of a bank-of-filter spectrum analyzer. Explain the principle of operation of the instrument. Discuss the expected performances of the instrument in terms of bandwidth, frequency resolution, sensitivity, and real-time capability.
- 3) The distortion behavior of an amplifier can be modeled taking advantage from the intercept concept. Explain how the knowledge of the second and third order intercept points can be used to estimate the power of the distortion harmonics for a given level of the input power.
- 4) In an OTDR the user has the possibility to select the time duration of the light pulses used by the instrument to carry out the measurement. Explain how and why the pulse length changes the performances of the instrument.
- 5) Explain how the diffraction grating spectrometer inserted in an optical spectrum analyzer works. Describe how the main components of the spectrometer determine the final wavelength resolution of the instrument.

slit opening

The total available time is two hours.