

TITLE : Design and Analysis of a Colpitts Oscillator using an Operational Amplifier

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PROBLEM STATEMENT:

Design and simulate op-amp based Colpitts oscillator in eSim to produce the stable sinusoidal output with the good start-up behaviour, low distortion and frequency stability. It is desired to run the oscillator at a typical frequency in the range of 10 kHz to 1 MHz, with minimum possible accuracy, power dissipation and quality of waveform for practical implementations.

ABSTRACT:

Oscillators play a crucial role in communication, instrumentation, and signal generational systems. The objective of this project is to design and simulate a Colpitts Oscillator using OP-Amp in eSim. The oscillation frequency is determined by a LC feedback network and, with gain supplied by the op-amp, oscillation is maintained to fulfill Barkhausen criteria. The circuit design is aiming to get a stable sinusoidal output with low distortion ratio, reliable start-up properties, good frequency stability, as well as power dissipation reduction. Oscillation frequency, waveform quality, total harmonic distortion (THD), and power efficiency will be measured as performance, making the design suitable for actual use at low to medium frequency regions including the 10 kHz–1 MHz where the ripple is high.

PROPOSED CIRCUIT:

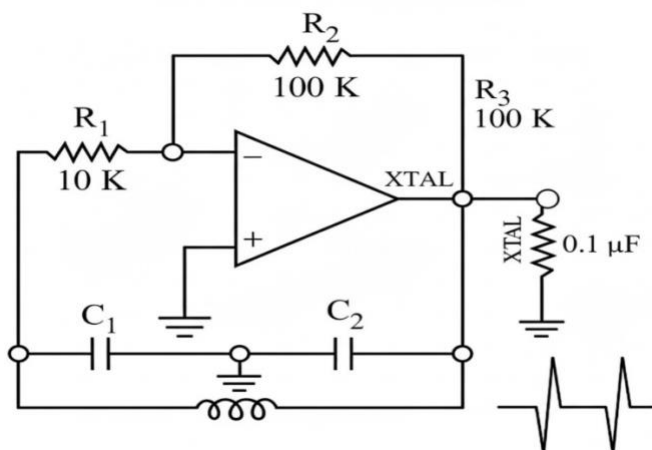


Fig 1 :Implementation of colpits oscilattor

REFERENCESS:

1. *Tutorial: Colpitts Oscillator Using Op-Amp*, Electronics-Tutorials, available at: <https://www.electronics-tutorials.ws/oscillator/colpitts.html>, accessed on September 2, 2025.
2. S. P. Rajagopalan, "Low-Frequency Colpitts Oscillator Using Operational Amplifiers," IEEE Transactions on Education, vol. E-23, no. 3, pp. 153–156, Aug. 1980.