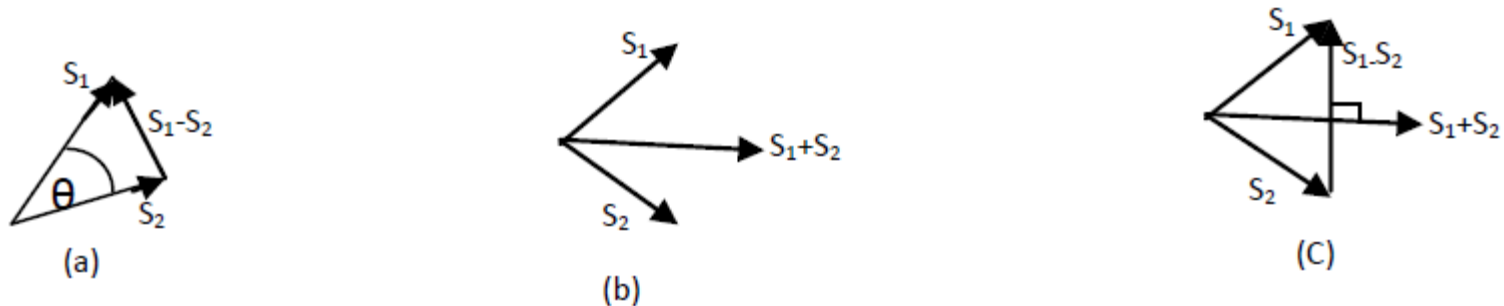# Amplitude and phase comparators

A good protective relay must have, among others, good sensitivity, reliability and fast response. These qualities depend on the effectiveness of the comparator. Comparator, as the brain box of a relay, must recognize any change at the input terminals and react quickly. There are two methods of comparison: the amplitude and phase comparison techniques.

In amplitude comparison technique, the comparator produces an output whose amplitude is proportional to the amplitude difference of the input quantities; while in phase comparison technique, the comparator compares the phase angles of the input quantities and produces pulses whose width is proportional to the phase difference of the input quantities

The amplitude comparator can be used as phase comparator and vice versa, if certain modifications are made

(a)

(b)

(C)

analysis of the vectors, S1 and S2. (a)difference of two vectors [amplitude comparison] (b) sum of 2 vectors and (c) combination of (a) and (b) [phase comparison].

Figure shows the in put vectors of amplitude comparator, S1 and S2 . (b) The sum of the vectors, S1 and S2 and (c) the combination of (a) and (b), which can be referred to as the phase comparison (amplitude comparison at 90o criterion) with the inputs S1-S2 and S1+S2. So amplitude comparison can be equated to phase comparison at +90oprovided that the inputs to the phase comparator are:
Sx=S1-S2 (1a)

and Sy=S1+S2