The series of positive terms and the alternating series are special types of these series with arbitrary signs.

(1) If the series of arbitrary signs

$$a_1 + a_2 + a_3 + \cdots + a_n + \cdots$$

be such that the series

$$|a_1| + |a_2| + |a_3| + \cdots + |a_n| + \cdots$$

is convergent, then the series $\sum a_n$ is said to be absolutely convergent.

e.g. A series $\sum a_n$ is said to be absolutely convergent if the series $\sum |a_n|$ is convergent. Exp $\sum a_n = 1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots$

(2) Conditional Convergence:-

A series $\sum a_n$ is said to be conditionally convergent if (i) $\sum a_n$ is convergent and

(ii) $\sum |a_n|$ is divergent (or $\sum a_n$ is not absolutely convergent.)

<u>Exp.</u> $\sum_{n=1}^{\infty} a_n = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} + \cdots$

for Example (instance)

① The series

$$\sum a_n = 1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} + \dots$$

is absolutely convergent, since the series

$$\sum |a_n| = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \frac{1}{5^2} + \dots$$

is known to be convergent.

② The alternating series

$$\sum a_n = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} + \dots$$

is convergent and the absolute values

$$\sum |a_n| = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots$$

is divergent, So the original series is conditionaly converg