

Study Material.

B.Sc. - II (Math Honrs)

Paper - 3

Sequence & Series.

Material Sl. no. \rightarrow I

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Study material for B.Sc. (Maths) - II

Sequence of reals

Def:

A sequence of reals is mapping x from \mathbb{N} (set of all natural numbers) to \mathbb{R} (set of all real numbers)

$$\text{i.e. } x : \mathbb{N} \rightarrow \mathbb{R}$$

Sequence x is generally denoted by $\{x(n)\}$ or $\{x_n\}$

Finite & Infinite Sequence:

A sequence having finite no. of terms is called finite sequence.

Ex: $\{1, 2, 3\}$ is a finite sequence

A sequence having infinite no. of terms is called infinite sequence

Examples

1. Let $x : \mathbb{N} \rightarrow \mathbb{R}$ defined by $x(n) = n, \forall n \in \mathbb{N}$.
Then the sequence $\{x(n)\}$ or $\{x_n\}$ can also be denoted as $\{n\}$ or $\{x_n\}$, where $x_n = n$

2. Let $x : \mathbb{N} \rightarrow \mathbb{R}$ defined by $x(n) = 2n, \forall n \in \mathbb{N}$.
This sequence is denoted by $\{2n\}$ or $\{x_n\}$, where $x_n = 2n, n \in \mathbb{N}$, it is the sequence of even positive integers.

3. Let $x: \mathbb{N} \rightarrow \mathbb{R}$ defined by $x(n) = \frac{1}{n}$, $\forall n \in \mathbb{N}$.

This sequence is denoted by ~~$\{x_n\}$~~ $\{\frac{1}{n}\}$ or $\{x_n\}$ where $x_n = \frac{1}{n}$, $n \in \mathbb{N}$.

This sequence can also be written in the form $\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots\}$. This sequence is called Harmonic sequence.

4. Let $x: \mathbb{N} \rightarrow \mathbb{R}$ defined by $x(n) = 5$, $\forall n \in \mathbb{N}$.

So, the sequence is $\{5, 5, 5, \dots\}$. This sequence is constant sequence.

5. Let $x: \mathbb{N} \rightarrow \mathbb{R}$, defined by $x(n) = (-1)^n$, $\forall n \in \mathbb{N}$.

So, the sequence is $\{(-1)^n\}$. This sequence can also be written in the form $\{-1, 1, -1, 1, \dots\}$

Bounded Sequence

A sequence $\{x_n\}$ is said to be bounded

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