Sequence and Series - Class XI

Related Questions with Solutions

Questions

Quetion: 01

Let $a_n, n \in N$ is an A.P. with common difference 'd' and all whose terms are non-zero. If n approaches infinity, then the sum $\frac{1}{\mathrm{a}_1 \mathrm{a}_2}+\frac{1}{\mathrm{a}_2 \mathrm{a}_3}+\ldots+\frac{1}{\mathrm{a}_n \mathrm{a}_{\mathrm{n}+1}}$ will approach.

A. $\frac{1}{\mathrm{a}_1 \mathrm{~d}}$

B. $\frac{2}{\mathrm{a}_1 \mathrm{~d}}$

C. $\frac{1}{2 \mathrm{a}_1 \mathrm{~d}}$

D. $a_1 d$

Solutions

Solution: 01

First term $=a$ common difference $=\mathrm{d}$ So, $\mathrm{a}_2=\mathrm{a}_1+\mathrm{d}, \mathrm{a}_3=\mathrm{a}_1+2 \mathrm{~d}$ Given,

$\frac{1}{\mathrm{a}_1 \mathrm{a}_2}+\frac{1}{\mathrm{a}_2 \mathrm{a}_3}+\ldots+\frac{1}{\mathrm{a}_{\mathrm{n}+1} \mathrm{a}_{\mathrm{n}}}$

$=\frac{1}{\mathrm{d}}\left[\frac{\mathrm{d}}{\mathrm{a}_1 \mathrm{a}_2}+\frac{\mathrm{d}}{\mathrm{a}_2 \mathrm{a}_3}+\cdots+\frac{\mathrm{d}}{\mathrm{a}_{\mathrm{n}+1} \mathrm{a}_{\mathrm{n}}}\right]$

$=\frac{1}{\mathrm{d}}\left[\frac{\mathrm{a}_2-\mathrm{a}_1}{\mathrm{a}_1 \mathrm{a}_2}+\frac{\mathrm{a}_3-\mathrm{a}_2}{\mathrm{a}_2 \mathrm{a}_3}+\cdots+\frac{\mathrm{a}_{\mathrm{n}+1}-\mathrm{a}_{\mathrm{n}}}{\mathrm{a}_{\mathrm{n}} \mathrm{a}_{\mathrm{n}+1}}\right]$

$=\frac{1}{\mathrm{d}}\left[\frac{1}{\mathrm{a}_1}-\frac{1}{\mathrm{a}_2}+\frac{1}{\mathrm{a}_2}-\frac{1}{\mathrm{a}_3}+\cdots+\frac{1}{\mathrm{a}_{\mathrm{n}}}-\frac{1}{\mathrm{a}_{\mathrm{n}+1}}\right]$

$=\frac{1}{\mathrm{d}}\left[\frac{1}{\mathrm{a}_1}-\frac{1}{\mathrm{a}_{\mathrm{n}+1}}\right]=\frac{1}{\mathrm{d}}\left[\frac{1}{\mathrm{a}_1}-\frac{1}{\mathrm{a}_1+\mathrm{nd}}\right]$

$=\frac{1}{\mathrm{a}_1 \mathrm{~d}}$

Correct Options

Answer:01

Correct Options: A