

Sequence and Series - Class XI

Past Year JEE Questions

Questions

Question: 01

Sum of infinite number of terms of GP is 20 and sum of their square is 100. The common ratio of GP is

- A. 5
- B. $3/5$
- C. $8/5$
- D. $1/5$

Solutions

Solution: 01

Explanation

Let a = first term of $G.P.$ and r = common ratio of $G.P.$;

Then $G.P.$ is a, ar, ar^2

$$\text{Given } S_{\infty} = 20 \Rightarrow \frac{a}{1-r} = 20$$

$$\Rightarrow a = 20(1-r) \dots (i)$$

Also $a^2 + a^2r^2 + a^2r^4 + \dots$ to $\infty = 100$

$$\Rightarrow \frac{a^2}{1-r^2} = 100$$

$$\Rightarrow a^2 = 100(1-r)(1+r) \dots (ii)$$

From (i), $a^2 = 400(1-r)^2$;

From (ii), we get $100(1-r)(1+r)$

$$= 400(1-r)^2$$

$$\Rightarrow 1+r = 4-4r$$

$$\Rightarrow 5r = 3$$

$$\Rightarrow r = 3/5.$$