

Sequence and Series - Class XI

Past Year JEE Questions

Questions

Question: 01

If $S = \frac{7}{5} + \frac{9}{5^2} + \frac{13}{5^3} + \frac{19}{5^4} + \dots$, then $160S$ is equal to _____.

Solutions

Solution: 01

Answer

Correct Answer is **305**

Explanation

$$S = \frac{7}{5} + \frac{9}{5^2} + \frac{13}{5^3} + \frac{19}{5^4} + \dots$$

$$\frac{1}{5}S = \frac{7}{5} + \frac{9}{5^2} + \frac{13}{5^3} + \dots$$

On subtracting

$$\frac{4}{5}S = \frac{7}{5} + \frac{2}{5^2} + \frac{4}{5^3} + \frac{6}{5^4} + \dots$$

$$S = \frac{7}{14} + \frac{1}{10} \left(1 + \frac{2}{5} + \frac{3}{5^2} + \dots \right)$$

$$S = \frac{7}{4} + \frac{1}{10} \left(1 - \frac{1}{5} \right)^{-2}$$

$$= \frac{7}{4} + \frac{1}{10} \times \frac{25}{16} = \frac{61}{32}$$

$$\Rightarrow 160S = 5 \times 61 = 305$$