Sequence and Series - Class XI

Past Year JEE Questions

Questions

Quetion: 01

The sum of the infinite series
$1 + \frac{2}{3} + \frac{7}{3^2} + \frac{12}{3^3} + \frac{17}{3^4} + \frac{22}{3^5} + \ldots\ldots$ is equal to :

A. $\frac{9}{4}$

B. $\frac{13}{4}$

C. $\frac{15}{4}$

D. $\frac{11}{4}$

Solutions

Solution: 01

Explanation

$S = 1 + \frac{2}{3} + \frac{7}{3^2} + \frac{12}{3^3} + \frac{17}{3^4} + \ldots.$

$\frac{S}{3} = \frac{1}{3} + \frac{2}{3^2} + \frac{7}{3^3} + \frac{12}{3^4} + \ldots.$

$2S = 1 + \frac{1}{3} + \frac{5}{3^2} + \frac{5}{3^3} + \frac{5}{3^4} + \ldots. +$ up to infinite terms

$\frac{2S}{3} = \frac{4}{3} + \frac{5}{3}\left\{\frac{1/3}{1-\frac{1}{3}}\right\} = \frac{5}{6} + \frac{4}{3} = \frac{13}{6}$

$\Rightarrow S = \frac{13}{4}$