

Que-3: Find the value of $x + \frac{2x}{2!} + \frac{3x}{3!} + \dots$

$$\begin{aligned}\text{Sol: } x + \frac{2x}{2!} + \frac{3x}{3!} + \dots &= \frac{1x}{1!} + \frac{2x}{2} + \frac{3x}{3 \times 2!} + \frac{4x}{4 \times 3!} + \dots \\ &= x \left(1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \dots \right) \\ &= e \cdot x\end{aligned}$$