

**Question:** The sum of n terms of the following series  $1 + (1 + x) + (1 + x + x^2) + \dots$  . will be \_\_\_\_\_.

**Solution:**

$$1 + (1 + x) + (1 + x + x^2) + \dots + (1 + x + x^2 + x^3 + \dots + x^{n-1}) + \dots$$

Required sum =  $[1 / (1 - x)] * \{(1 - x) + (1 - x^2) + (1 - x^3) + (1 - x^4) + \dots \dots \dots \text{upto } n \text{ terms}\}$

$$= [1 / (1 - x)] * [n - \{x + x^2 + x^3 + \dots \dots \dots \text{upto } n \text{ terms}\}]$$

$$= \left(\frac{1}{1-x}\right) * \left(n - \frac{x(1-x^n)}{1-x}\right)$$

$$= \frac{n*(1-x) - x(1-x^n)}{1-x^2}$$