NCERT 11.9.5.30

EE23BTECH11043 - BHUVANESH SUNIL NEHETE*

Question

A man deposited Rs 10000 in a bank at the rate of 5% simple interest anually. Find the amount in 15^{th} year since he deposited the amount and also calculate the total amount after 20 years.

Answer

Parameter	Value/Formula	description
$x(0)$	Rs.10000	Total amount deposited
r	5	Rate of interest
$x(n)$	$(x(0)+nd)\,u(n)$	amount at the start of $(n+1)^{\text{th}}$ year
d	500	common difference
$y(n)$		sum upto n^{th} term

TABLE 1
Input data

$$\text{Interest in one year} = \frac{10000 \times 5 \times 1}{100} \tag{1}$$

$$d = 500 \tag{2}$$

From (2) and Table 1:

$$x(n) = (10000 + 500n)u(n) \tag{3}$$

From (3)

$$X(z) = \frac{10000}{1 - z^{-1}} + \frac{500z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \tag{4}$$

Amount in 15^{th} year is

$$x(14) = x(0) + 14 \times d \tag{5}$$

$$\implies x(14) = 17000 \tag{6}$$

Total amount after 20 years is

$$x(20) = x(0) + 20 \times 500 \tag{7}$$

$$\implies x(20) = 20000 \tag{8}$$

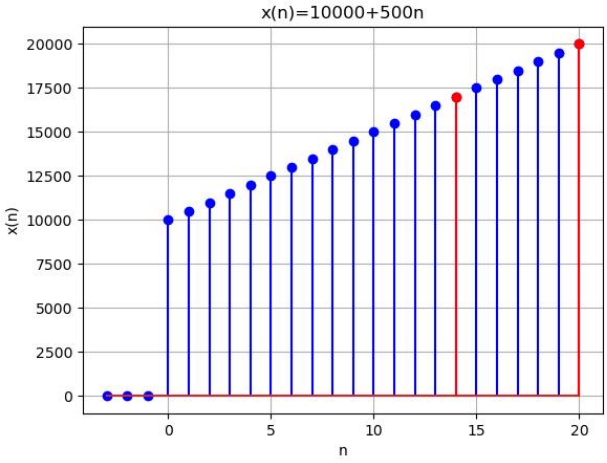

Fig. 1. graph for $x(n) = 10000 + 500n$