

ASSIGNMENT 1

EE22BTECH11060 - TEJAVATH KUSHAL*

QUESTION 17:

A man starts repaying a loan as first instalment of Rs.100. If he increases the instalment by Rs 5 every month, what amount he will pay in the 30th instalment?

SOLUTION:

Parameter	Value	Description
$x(n)$	$(x(0) + nd)u(n)$	general term
$x(0)$	100	first term
d	5	Common difference
$x(29)$	$(x(0) + 29d)u(n)$	30 th term

TABLE 0
PARAMETERS

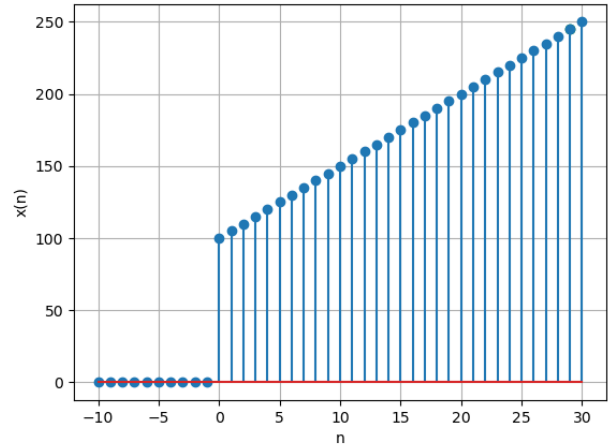


Fig. 0. Stem Plot of $x(n)$ v/s n

$$x(n) = 100 + 5n \quad (1)$$

$$x(29) = x(0) + 29d \quad (2)$$

$$x(29) = 100 + 145 \quad (3)$$

$$x(29) = 245 \quad (4)$$

Z transform of $x(n) = 100 + 5n$,

$$X(z) = \sum_{n=-\infty}^{\infty} x(n) z^{-n} \quad (5)$$

$$= \sum_{n=-\infty}^{\infty} (100 + 5n) u(n) z^{-n} \quad (6)$$

$$= \sum_{n=-\infty}^{\infty} (100) u(n) z^{-n} + \sum_{n=-\infty}^{\infty} (5n) u(n) z^{-n} \quad (7)$$

$$\Rightarrow X(z) = \frac{100}{1 - z^{-1}} + \frac{5z^{-2}}{(1 - z^{-1})^2} \quad (8)$$

$$ROC : |z| > 1$$