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 30^{th} 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

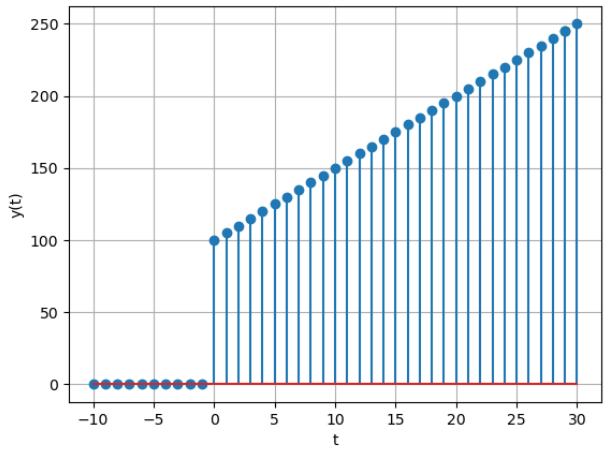

Fig. 0. Stem Plot of $y(t)$ v/s t

$$x(n) = 100 + 5n \tag{1}$$
$$x(29) = x(0) + 29d \tag{2}$$
$$x(29) = 100 + 145 \tag{3}$$
$$x(29) = 245 \tag{4}$$

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

$$X(z) = \sum_{n=-\infty}^{\infty} x(n)\, z^{-n} \tag{5}$$
$$= \sum_{n=-\infty}^{\infty} (100 + 5n)\, u(n)\, z^{-n} \tag{6}$$
$$= \sum_{n=-\infty}^{\infty} (100)\, u(n)\, z^{-n} + \sum_{n=-\infty}^{\infty} (5n)\, u(n)\, z^{-n} \tag{7}$$
$$\implies X(z) = \frac{100}{1 - z^{-1}} + \frac{5z^{-2}}{(1 - z^{-1})^2} \tag{8}$$
$$ROC : |z| > 1$$