(iii) Z Transform ~~of~~ Finite & Infinite Sequence Signal →

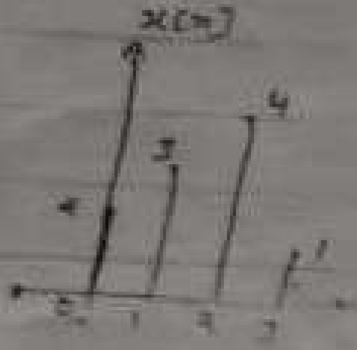
(a) Finite Sequence Signal
(b) Infinite Sequence Signal
(c) Both Sided " "

(a) Finite Sequence Signal →

(A) +Ve Sided Finite Sequence Signal
(B) - Ve
(C) Both

(A) +ve Sided Finite Sequence Signal →

EXAMPLE →



$\Rightarrow x[n] = \{2, 3, 4, 1\}$
↑
origin

Determine $X(z)$ & Their ROC =

Sol →
We know that,

$$\boxed{Z[x[n]] = \sum_{n=-\infty}^{\infty} x[n] z^{-n}}$$

$$= \sum_{n=0}^{3} x[n] z^{-n}$$

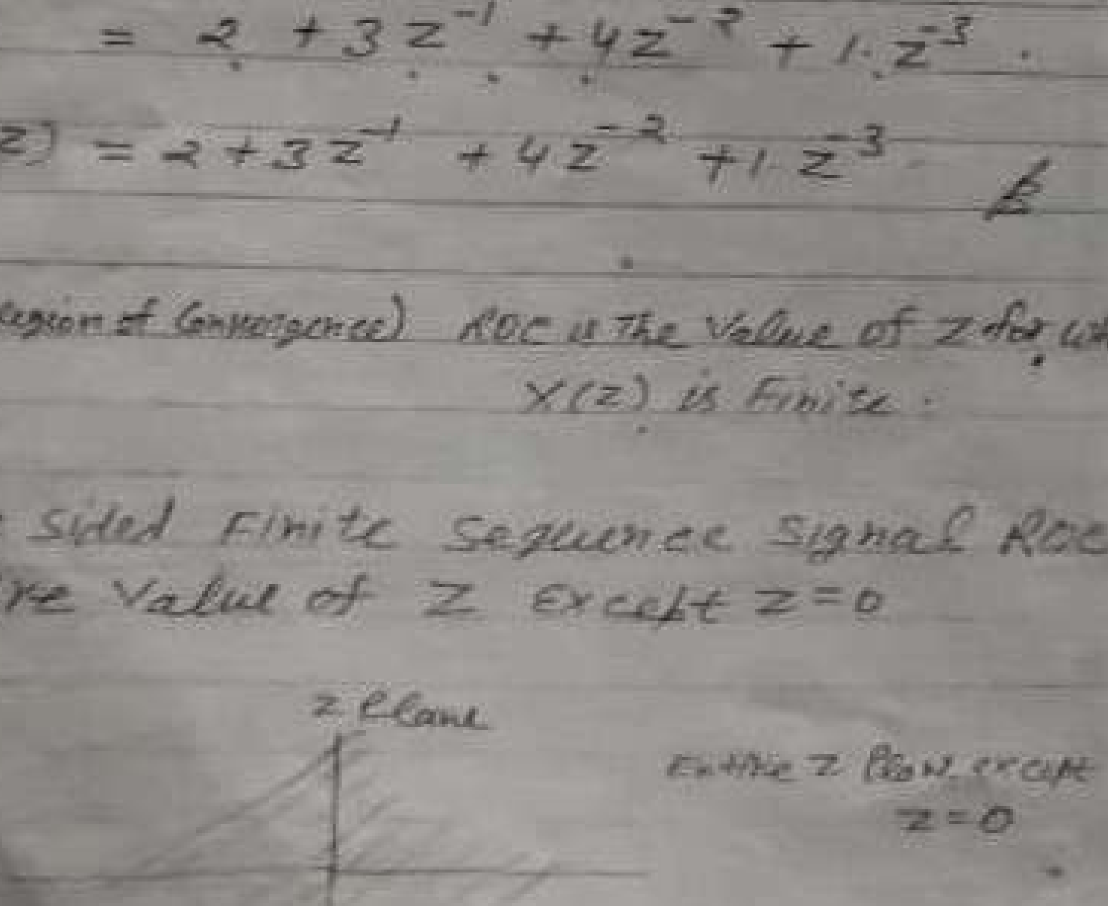
$$Z[x[n]] = x[0] z^{-0} + x[1] z^{-1} + x[2] z^{-2} + x[3] z^{-3}$$

$$= 2 + 3z^{-1} + 4z^{-2} + 1 \cdot z^{-3}$$

$$X(z) = 2 + 3z^{-1} + 4z^{-2} + 1 \cdot z^{-3}$$

ROC → (Region of Convergence) ROC is the value of z for which $X(z)$ is finite.

For +ve sided finite sequence signal ROC is entire value of z except $z = 0$



(B) -ve Sided Finite Sequence Signal $\Rightarrow$

EXAMPLE $\rightarrow$

$$\Rightarrow x[n] = \{1, 4, 3, 2, \underset{\uparrow}{0}\}$$

Determine $X(z)$ & Their ROC

Sol^n $\Rightarrow$ We know That, $Z[x[n]] = \sum_{-\infty}^{\infty} x[n] z^{-n}$

$$= \sum_{-4}^{-1} x[n] z^{-n}$$

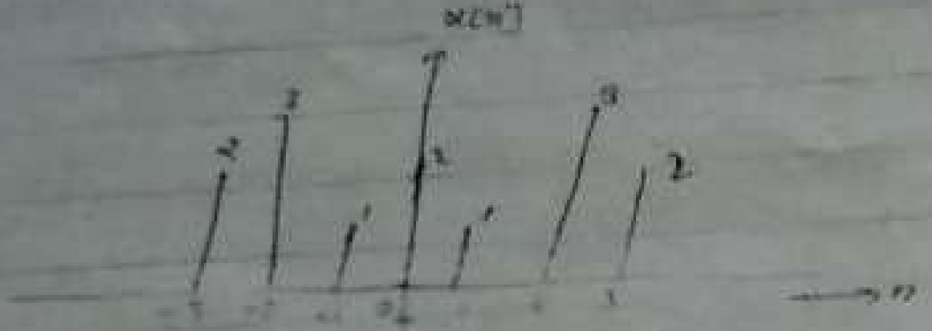
$$Z[x[n]] = x[-4]z^4 + x[-3]z^3 + x[-2]z^2 + x[-1]z'$$

$$X[z] = 1z^4 + 4z^3 + 3z^2 + 2z$$

ROC $\Rightarrow$ ROC of -ve Sided Finite Sequence signal is Entire z plane except $z = \infty$

(C) Both Sided Finite Sequence Signal →

EXAMPLE →



$$x[n] = \{2, 3, 1, \underset{\uparrow}{2}, 1, 3, 2\}$$

Determine $X(z)$ & Their ROC

Sol^n → We Know That, $Z[x[n]] = \sum_{n=-\infty}^{\infty} x[n] z^{-n}$

$$= \sum_{n=-3}^{3} x[n] z^{-n}$$

$$X(z) = x[-3]z^{3} + x[-2]z^{2} + x[-1]z^{1} + x[0]z^{0} + x[1]z^{-1} + x[2]z^{-2} + x[3]z^{-3}$$

$$X(z) = 2z^{3} + 3z^{2} + 1\cdot z + 2z^{0} + 1z^{-1} + 3z^{-2} + 2z^{-3}$$

$$X(z) = 2z^{3} + 3z^{2} + 1\cdot z + 2 + 1z^{-1} + 3z^{-2} + 2z^{-3}$$

ROC → ROC of Both sided finite sequence signal is Entire z Plane except $z = 0$ & ∞

(2 value छोड़ी जाती)