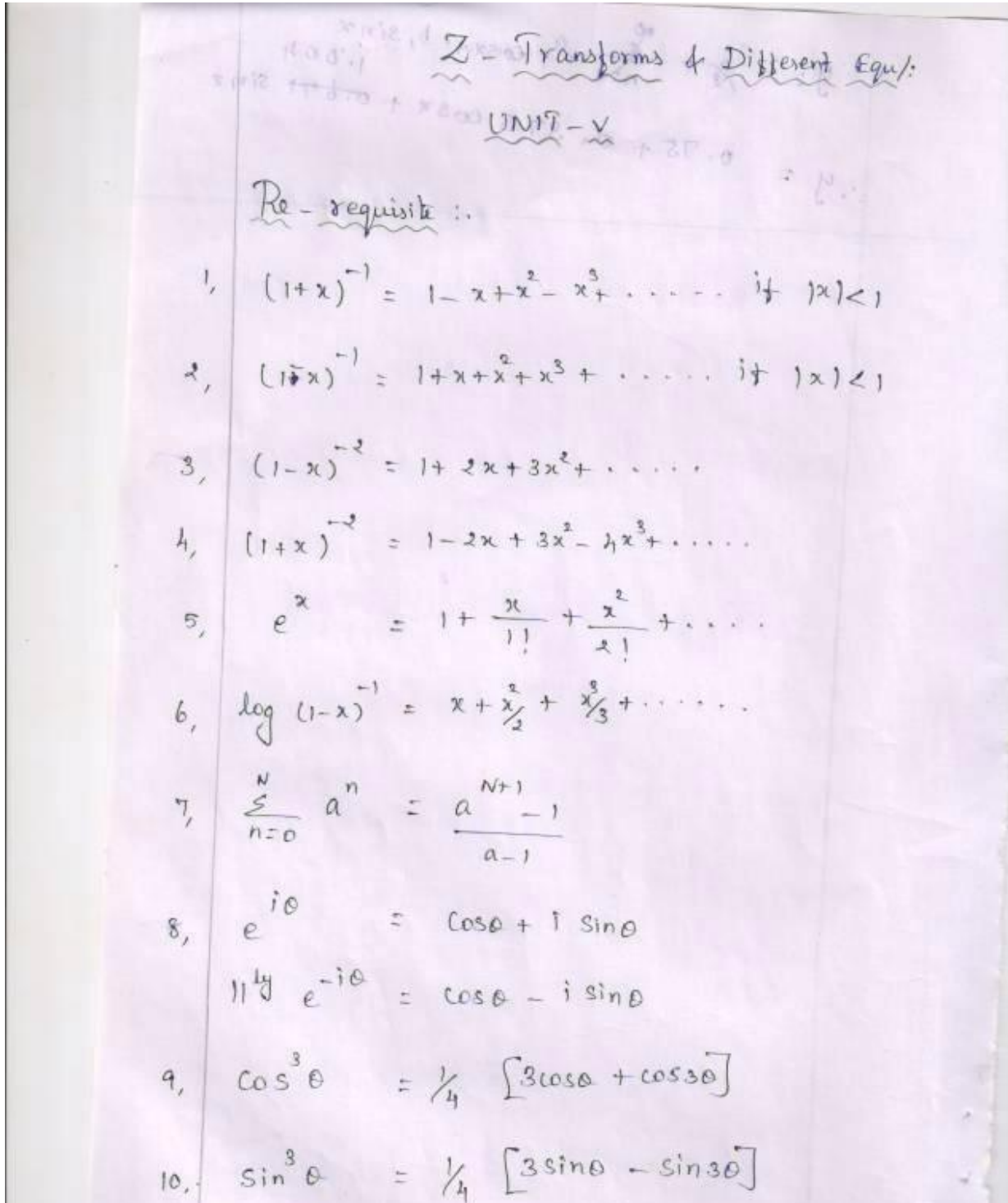




TOPIC 1: Introduction to Z transforms





UNIT 5 Step function of z-transform

$$u(k) : \{1, 1, 1, \dots\} = \begin{cases} 1, & k \geq 0 \\ 0, & k < 0 \end{cases}$$

(3) Unit Impulse function

A discrete unit impulse function is defined by

$$\delta(k) : \{1, 0, 0, \dots\} = \begin{cases} 1, & k = 0 \\ 0, & k \neq 0 \end{cases}$$

Partial fraction

$$1, \frac{1}{(ax+b)(cx+d)} = \frac{A}{(ax+b)} + \frac{B}{(cx+d)}$$

$$2, \frac{1}{ax^2+bx+c} = \frac{Ax+B}{ax^2+bx+c}$$

(not factored)

$$3, \frac{1}{(ax+b)^3} = \frac{A}{(ax+b)} + \frac{B}{(ax+b)^2} + \frac{C}{(ax+b)^3}$$

z-transform (one sided or unilateral)

Let $\{f(n)\}$ be a sequence defined for $n = 0, 1, 2, \dots$ and $f(n) = 0$

for $n < 0$, then its z-transform is

$$F(z) = \sum_{n=0}^{\infty} f(n) z^{-n}$$



where, z is an arbitrary complex number.

Definition:
 z -transform for discrete values of t

If $\{f(t)\}$ is a function defined for discrete value of t where, $t = nT$

$$z\{f(t)\} = F(z) = \sum_{n=0}^{\infty} f(nT) z^{-n}$$

$n = 0, 1, 2, \dots, \infty$ be in the sampling period, then z -transform of $f(t)$ is defined as,

$$z\{f(t)\} = F(z) = \sum_{n=0}^{\infty} f(nT) z^{-n}$$