

SNS COLLEGE OF TECHNOLOGY



(An Autonomous Institution)

Coimbatore – 35

DEPARTMENT OF MATHEMATICS

UNIT-Y Z-TRANSFORM

Solving the Officence Equations using z-Dransforms

Solve the difference equation
$$y(n+3) - 3y(n+1) + 2y(n) = 0$$

is gin that $y(0) = A$, $y(1) = 0$, $y(2) = 8$
Taking z OBS
 $z [y(n+3)] - 3z [y(n+1)] + 2z [y(n)] = 0$
 $z^{3}F(z) - z^{3}y(0) - z^{9}y(0) - z y(2) - 3i[z F(z) - z y(0)] + 2F(2) = 0$
 $\Rightarrow z^{3}F(z) - z^{3}(4) - z^{2}(0) - 2(8) - 3z F(z) + 3z (4) + 2F(2) = 0$
 $\Rightarrow z^{3}F(z) - 3z F(z) + 2F(z) = 4z^{3} + 8z - 12z$
 $F(z) [z^{3} - 3z + 2] = 4z^{3} - 4z$
 $F(z) = \frac{4z^{3} - 4z}{z^{3} - 3z + 2} = \frac{4z^{3} - 4z}{(z+2)(z-1)^{2}}$

$$\frac{F(z)}{z} = \frac{A + z^2 - A}{(z+z)(z-1)^2} = \frac{A}{z+2} + \frac{B}{z-1} + \frac{C}{(z-1)^2},$$

$$put = -2 \Rightarrow A = \frac{4}{3}$$

$$put = 1 \Rightarrow C = 0$$

$$put = z = 0 \Rightarrow \frac{8}{3}.$$



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DEPARTMENT OF MATHEMATICS UNIT-Y Z-TRANSFORM

 $\frac{f(z)}{z} = \frac{4z^2 - 4}{(z+z)(z-1)^2} = \frac{4/3}{z+z} + \frac{8/3}{z-1} \implies F(z) = \frac{4}{3} \left(\frac{z}{z+z}\right) + \frac{8}{3} \left(\frac{z}{z-1}\right)$ $F[2] = \frac{4}{3} \frac{2}{(2+2)} + \frac{8}{3} \frac{2}{(2-1)}$ $=\frac{4}{3}(-2)^{\eta}+\frac{8}{5}(1)^{\eta}$ 3) Solve the difference equ. y(n)+ 3y(n-1)=4y(n-2)=0. nz 2 u gn. that y(0)=3, y(1)=-2; y(n)+ 3y (n-1)- 4 y (n-2)=0 Replace n by n+2. y(n+2) + 3y(n+1) - 4y(n) = 0