Sandip Foundation's
Sandip Institute of Technology & Research Centre, Nashik
S. E. III : Mathematics
UNIT 2 : PART II : Assignment III : Z – Transform

1. Find the z-transform of the following : For $k \geq 0$,

(i) $f(k) = \{(\frac{1}{4})^{|k|}\}$, (ii) $f(k) = \sin(3k + 4)$, (iii) $f(k) = \cos(\frac{k\pi}{4} + \alpha)$

(iv) $f(k) = \begin{cases} 5^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$

2. Find the z – transform of the following : For $k \geq 0$,

(i) $f(k) = e^{-3k}\cos 4k$, (ii) $f(k) = 4^k \sin(2k + 3)$, (iii) $f(k) = (k + 1)a^k$

(iv) $f(k) = k(30)^k$, (iv) $f(k) = \frac{2^k}{k}, k \neq 0$, (vi) $f(k) = \frac{\sin ak}{k}$

3. Find the inverse z – transforms of the following :

(i) $F(z) = \frac{1}{(z-2)(z-3)}$, (i) $|z| < 2$, (ii) $2 < |z| < 3$, (iii) $|z| > 3$

(ii) $F(z) = \frac{z+2}{z^2 - 2z + 1}, |z| > 1$, (iii) $F(z) = \frac{z(z+1)}{z^2 - 2z + 1}, |z| > 1$,

(v) $F(z) = \frac{z}{(z - \frac{1}{4})(z - \frac{1}{5})}, |z| > \frac{1}{4}$

4. Find the inverse z – transforms of the following by inversion integral method :

(i) $F(z) = \frac{10z}{(z-1)(z-2)}$, (ii) $F(z) = \frac{z^2}{z^2 - 7z + 12}$

(iii) $F(z) = \frac{z^3}{(z-1)(z-2)^2}$, (iv) $F(z) = (\frac{z}{z-2})^2$

5. Solve the following difference equations : For $k \geq 0$,

(i) $f((k+1) + \frac{1}{2}f(k) = (\frac{1}{2})^k, f(0) = 0$,

(ii) $f(k+2) + f(k+1) + f(k) = 0, f(0) = f(1) = 1$

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