

**Sandip Foundation's Sandip Institute of Technology & Research Centre, Nashik**  
**S.E. Sem. III : Mathematics**  
**UNIT II : PART II : Z- transforms ( Z T ) : Multiple Choice Questions**

**Chose the Correct Alternative**

1. Z-transform of the sequence  $f(k)$  i.e.  $Z\{f(k)\}$  is defined as  
 (a)  $\sum_{k=0}^{\infty} f(k) z^{-k}$ , (b)  $\sum_{k=-\infty}^{-1} f(k) z^{-k}$ , (c)  $\sum_{k=-\infty}^{\infty} f(k) z^{-k}$ , (d) none of these
2.  $Z\{a^k\}$ ,  $k \geq 0$  is given by (a)  $\frac{z}{z-a}$ , (b)  $\frac{z}{z+a}$ , (c)  $\frac{z}{a-z}$ , (d) none of these.
3.  $Z\{\sin bk\} = \dots$   
 (a)  $\frac{z \sin b}{z^2 - 2z \cos b + 1}$ , (b)  $\frac{z^2 - z \cos b}{z^2 - 2z \cos b + 1}$ , (c)  $\frac{z^2 - z \sin b}{z^2 - 2z \cos b + 1}$ , (d) none of these
4.  $Z\{\cos bk\} = \dots$   
 (a)  $\frac{z \cos b}{z^2 - 2z \cos b + 1}$ , (b)  $\frac{z^2 - z \cos b}{z^2 - 2z \cos b + 1}$ , (c)  $\frac{z^2 - z \sin b}{z^2 - 2z \cos b + 1}$ , (d) none of these
5.  $Z\{\sinh bk\} = \dots$   
 (a)  $\frac{z \sinh b}{z^2 - 2z \cosh b + 1}$ , (b)  $\frac{z^2 - z \cosh b}{z^2 - 2z \cosh b + 1}$ , (c)  $\frac{z^2 - z \sinh b}{z^2 - 2z \cosh b + 1}$ , (d) none of these
6.  $Z\{\cosh bk\} = \dots$   
 (a)  $\frac{z \cosh b}{z^2 - 2z \cosh b + 1}$ , (b)  $\frac{z^2 - z \cosh b}{z^2 - 2z \cosh b + 1}$ , (c)  $\frac{z^2 - z \sinh b}{z^2 - 2z \cosh b + 1}$ , (d) none of these
7.  $Z\{a^k f(k)\} = \dots$ , (a)  $F\left(\frac{z}{a}\right)$ , (b)  $F\left(\frac{a}{z}\right)$ , (c)  $F(az)$ , (d) none of these.
8.  $Z\{k f(k)\} = \dots$ , (a)  $z \frac{d}{dz} [F(z)]$ , (b)  $-z \frac{d}{dz} [F(z)]$ , (c)  $\int_z^{\infty} \frac{F(z)}{z} dz$ , (d) none of these
9.  $Z\left\{\frac{f(k)}{k}\right\} = \dots$ , (a)  $z \frac{d}{dz} [F(z)]$ , (b)  $-z \frac{d}{dz} [F(z)]$ , (c)  $\int_z^{\infty} \frac{F(z)}{z} dz$ , (d) none of these
10.  $Z\{(30)^k\}$ ,  $k \geq 0$ , is given by (a)  $\frac{z}{z-30}$ , (b)  $\frac{z}{30-z}$ , (c)  $\frac{1}{z-30}$ , (d)  $\frac{1}{z+30}$ ,
11.  $Z\{(30)^k\}$ ,  $k \geq 0$ , is given by (a)  $\frac{z}{z-30}$ , (b)  $\frac{z}{30-z}$ , (c)  $\frac{1}{z-30}$ , (d)  $\frac{1}{z+30}$ ,
12.  $Z\{\cos \pi k\}$ ,  $k \geq 0$ , is given by (a)  $\frac{z(z-1)}{(z+1)^2}$ ,  $|z| \neq 1$ , (b)  $\frac{z-1}{z+1}$ ,  $|z| \neq 1$ ,  
 (c)  $\frac{z(z+1)}{(z-1)^2}$ ,  $|z| \neq 1$ , (d)  $\frac{z}{z+1}$ ,  $|z| \neq 1$
13.  $Z\{2^k \sin \frac{\pi}{2} k\}$  is given by  
 (a)  $\frac{2z}{z^2-4}$ ,  $|z| \neq 2$ , (b)  $\frac{2z}{z^2-4}$ ,  $|z| \leq 2$ , (c)  $\frac{2z}{z^2+4}$ ,  $|z| \leq 2$ , (d)  $\frac{2z}{z^2+4}$ ,  $|z| \neq 2$
14.  $Z\{k 5^k\}$ ,  $k \geq 0$  is given by  
 (a)  $\frac{(z-5)^2}{5z}$ ,  $|z| \neq 5$ , (b)  $\frac{(z-5)^2}{z}$ ,  $|z| \neq 5$ , (c)  $\frac{5z}{(z-5)^2}$ ,  $|z| \neq 5$  (d)  $\frac{5z}{(z+5)^2}$ ,
15.  $Z\{k^n f(k)\}$  is (a)  $(z \frac{d}{dz})^{n-1} F(z)$ , (b)  $(-z \frac{d}{dz})^n F(z)$  (c)  $(z \frac{d}{dz})^n F(z)$ , (d)  $(-z)^n \frac{d}{dz} F(z)$

16.  $Z \{ e^{-k} \}$  is (a)  $\frac{z}{z - e^{-1}}$ , (b)  $\frac{z}{e^{-1} - z}$ , (c)  $\frac{1}{z - e^{-1}}$ , (d) none of these
17.  $Z \{ k (30)^k \}$  is (a)  $\frac{z}{(z - 30)^2}$ , (b)  $\frac{30z}{(z - 30)^2}$ , (c)  $\frac{1}{(z - 30)^2}$ , (d) none of these
18.  $Z \{ \frac{e^{-k} - e^{-2k}}{k} \}$  is given by (a)  $\log \left( \frac{z - e^{-2}}{z - e^{-1}} \right)$ , (b)  $\log \left\{ \frac{e^{-2} - z}{e^{-1} - z} \right\}$ , (c)  $\log \left( \frac{z - e^{-1}}{z - e^{-2}} \right)$ , (d) none of these
19.  $Z \{ k a^k \}$  is given by (a)  $\frac{az}{(z - a)^2}$ , (b)  $\frac{z}{(z - a)^2}$ , (c)  $\frac{a}{(z - a)^2}$ , (d) none of these
20.  $Z \{ e^{-ak} \}$  is given by (a)  $\frac{z}{z - e^{-a}}$ , (b)  $\frac{1}{z - e^{-a}}$ , (c)  $\frac{z}{z + e^{-a}}$ , (d) none of these
21.  $Z^{-1} \left\{ \frac{z}{z - 2} \right\}$ ,  $|z| < 2$  is given by (a)  $2^k$ ,  $k \leq 0$ , (b)  $2^{k-1}$ ,  $k < 0$ , (c)  $2^k$ ,  $k \geq 0$ , (d)  $-2^k$ ,  $k \geq 0$
22.  $Z^{-1} \left\{ \frac{z}{z - 3} \right\}$ ,  $|z| < 3$  is given by (a)  $-3^k$ ,  $k < 0$ , (b)  $3^{k-1}$ ,  $k < 0$ , (c)  $-3^{k-1}$ ,  $k \geq 0$ , (d)  $3^k$ ,  $k \geq 0$
23.  $Z^{-1} \left\{ \frac{1}{z - 3} \right\}$ ,  $|z| < 3$  is given by (a)  $3^{k+1}$ ,  $k \geq 0$ , (b)  $3^k$ ,  $k \leq 0$ , (c)  $3^{k+1}$ ,  $k \geq 1$ , (d)  $-3^{k+1}$ ,  $k \leq 0$
24.  $Z^{-1} \left\{ \frac{1}{z - 3} \right\}$ ,  $|z| < 3$  is given by (a)  $3^{k-1}$ ,  $k \geq 1$ , (b)  $3^{k-1}$ ,  $k \leq 1$ , (c)  $3^k$ ,  $k \geq 0$ , (d)  $-3^k$ ,  $k \geq 1$
25.  $Z^{-1} \left\{ \frac{1}{(z - a)^2} \right\}$ ,  $|z| < |a|$  is given by  
 (a)  $ka^{k-1}$ ,  $k \geq 0$ , (b)  $a^{k-1}$ ,  $k \geq 0$ , (c)  $ka^{k-1}$ ,  $k < 0$ , (d)  $(k - 1)a^k$ ,  $k \leq 0$
26. Inverse Z-transform of  $F(z)$  by inversion integral method is  
 (a)  $f(k) = \sum [\text{Residue of } z^k F(z) \text{ at the poles of } F(z)]$ , (b)  $f(k) = \sum [\text{Residue of } z^{k+1} F(z) \text{ at the poles of } F(z)]$   
 (c)  $f(k) = \sum [\text{Residue of } z^{k+2} F(z) \text{ at the poles of } F(z)]$ , (d)  $f(k) = \sum [\text{Residue of } z^{k-1} F(z) \text{ at the poles of } F(z)]$
27.  $Z^{-1} \left\{ \frac{z \sinh 3}{z^2 - 2z \cosh 3 + 1} \right\}$ ,  $k \geq 0$  is given by  
 (a)  $\cosh 2k$ , (b)  $\cosh 3k$ , (c)  $\sinh 2k$ , (d)  $\sinh 3k$
28.  $Z^{-1} \left\{ \frac{z^2}{(z - 3)^2} \right\}$ ,  $k \geq 0$ ,  $|z| < 3$  is given by  
 (a)  $-(k + 1)3^k$ , (b)  $(k + 1)3^k$ , (c)  $(k + 1)3^{-k}$ , (d)  $(k - 1)3^k$
29.  $Z^{-1} \left\{ \frac{z}{(z - 1)(z - 2)} \right\}$ ,  $k \geq 0$ ,  $|z| < 2$  is given by  
 (a)  $1 - 2^k$ , (b)  $2^k - 1$ , (c)  $\frac{1^k}{2} - 1$ , (d)  $k - 1$
30.  $Z \{ f(k + 1) \}$ ,  $k \geq 0$  is given by  
 (a)  $zF(z) + zf(0)$ , (b)  $zF(z) - zf(0)$ , (c)  $zF(z) - f(0)$ , (d)  $z^2 F(z) - zf(0)$
31.  $Z \{ f(k + 2) \}$ ,  $k \geq 0$  is given by  
 (c)  $z^2 F(z) + 2f(0) + f(1)$ , (d)  $z^2 F(z) - z^2 f(0) - f(1)$
32.  $Z \{ f(k - 1) \}$ ,  $k \geq 0$  is given by  
 (a)  $z^{-1} F(z)$ , (b)  $z^{-1} F(z) - f(0)$ , (c)  $zF(z)$ , (d)  $z^{-2} F(z) - z^{-1} f(0)$
33.  $Z \{ f(k - 2) \}$ ,  $k \geq 0$  is given by  
 (a)  $z^2 F(z) - zf(0)$ , (b)  $z^{-1} F(z) - f(0)$ , (c)  $z^{-2} F(z)$ , (d)  $z^{-2} F(z) - z^{-1} f(0)$
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