

SRM Institute of Science and Technology

Faculty of Engineering and Technology

Department of Mathematics

Question Bank- Z-Transform(Unit-5)

1. $Z(5)$ is

- A. $\frac{z}{z-1}$
- B. $5 \cdot \frac{z}{z-1}$
- C. $\frac{1}{5} \cdot \frac{z}{z-1}$
- D. $\frac{z-1}{z}$

ANSWER: B

2. $Z\left(\frac{1}{n}\right) =$

- A. $\log\left(\frac{z}{z-1}\right)$ if $|z| > 1$
- B. $\log\left(\frac{z}{z+1}\right)$
- C. $\log\left(\frac{z+1}{z}\right)$
- D. $\log\left(\frac{z-1}{z^2}\right)$ if $|z| > 1$

ANSWER: A

3. Find $Z^{-1}\left(\frac{z}{(z-1)^2}\right)$

- A. $n+1$
- B. $n-1$
- C. n
- D. $\frac{1}{n}$

ANSWER: C

4. Poles of $\phi(z) = \frac{z^n}{(z-1)(z-2)}$ are

- A. $z = 1, 0$
- B. $z = 0, 2$
- C. $z = -1, -2$
- D. $z = 1, 2$

ANSWER: D

5. $Z[na^n] =$

- A. $\frac{az}{(z-a)^2}$
- B. $\frac{z}{(z-a)^2}$
- C. $\frac{a}{(z-a)^2}$

D. $\frac{z}{(z-a)^3}$

ANSWER: A

6. $Z\left[\cos\frac{n\pi}{2}\right] =$

A. $\frac{z}{z^2+1}$

B. $\frac{z}{z^2-1}$

C. $\frac{z^2}{z^2+1}$

D. $\frac{z^2}{z^2-4}$

ANSWER: B

7. $Z^{-1}\left[\frac{z}{(z-a)^2}\right] =$

A. a^{n-1}

B. na^{n+1}

C. a^{n+1}

D. na^{n-1}

ANSWER: D

8. Poles of $\phi(z) = \frac{z^n(z+1)}{(z-1)^3}$ are

A. $z = -1$

B. $z = 1$

C. $z = 0$

D. $z = 3$

ANSWER: B

9. What is $Z[(-2)^n]$

A. $\frac{z}{z+2}$

B. $\frac{-z}{z+2}$

C. $\frac{-z}{z-2}$

D. $\frac{z}{z-2}$

ANSWER: A

10. The value of $Z\left[\frac{1}{n!}\right]$ is

A. $e^{-\left(\frac{1}{z}\right)}$

B. e^z

C. $e^{\left(\frac{1}{z}\right)}$

D. e^{-z}

ANSWER: C

11. If $Z(f(n)) = F(z)$ and $Z(g(n)) = G(z)$, then the Z -transform of $f(n) * g(n)$ is

- A. $F(z) + G(z)$
- B. $F(z).G(z)$
- C. $F(z) - G(z)$
- D. $F(z) \div G(z)$

ANSWER: B

12. Poles of $\phi(z) = \frac{z^n(z+1)}{(z-2)^3}$ are

- A. -1 (order 3)
- B. 1 (order 3)
- C. -2 (order 3)
- D. 2 (order 3)

ANSWER: D

13. If $Z[f(t)] = F(z)$ then $\lim_{z \rightarrow \infty} F(z) =$

- A. $f(0)$
- B. $f(1)$
- C. $\lim_{x \rightarrow \infty} f(t)$
- D. $f(\infty)$

ANSWER: A

14. $\phi(z) = \frac{z^n(2z+4)}{(z-2)^3}$ has a pole 2 of order

- A. 2
- B. 1
- C. 3
- D. 4

ANSWER: C

15. What is $Z[e^{-5n}]$?

- A. $\frac{z}{z - e^{-5}}$
- B. $\frac{z}{z + e^{-5}}$
- C. $\frac{z}{z - e^{-1}}$
- D. $\frac{z}{z + e^{-1}}$

ANSWER: A

16. If $F(Z) = \frac{10z}{(z-1)(z-2)}$ then the value of $f(0) = \dots$ using final value theorem

- A. 0
- B. 1
- C. 2
- D. 3

ANSWER: A

17. The value of $Z\left(\frac{a^n}{n!}\right)$

- A. $e^{\left(\frac{1}{z}\right)}$
- B. $e^{\left(\frac{a}{z}\right)}$
- C. $e^{-\left(\frac{1}{z}\right)}$
- D. $e^{-\left(\frac{a}{z}\right)}$

ANSWER: B

18. The value of $Z(e^{-at})$

- A. $\frac{Z}{Z-T}$
- B. $\frac{Z}{Z+e^{aT}}$
- C. $\frac{Z}{Z-e^{aT}}$
- D. $\frac{Z}{Z-e^{-aT}}$

ANSWER: D

19. The Z -transform of $a^n \cos n\pi$ is

- A. $\frac{1}{z+a}$
- B. $\frac{z}{z+a}$
- C. $\frac{z}{z-a}$
- D. $\frac{1}{z-a}$

ANSWER: B

20. If $Z[f(t)] = F(z)$ then $Z[f(t+T)]$ is

- A. $z[F(z) + f(0)]$
- B. $z^2[F(z) + f(0)]$
- C. $z[F(z) - f(0)]$
- D. $z^2[F(z) - f(0)]$

ANSWER: D

21. Solve $y_{n+1} - 3y_n = 0$ given $y_0 = 1$

- A. $3n$
- B. 3^n
- C. 3^{n-1}
- D. $2n + 1$

ANSWER: B

22. $Z[a^n u(n)]$ exists only if

- A. $|z| < |a|$
- B. $|z| \leq |a|$
- C. $|z| > |a|$

D. $|z| = |a|$

ANSWER: C

23. $Z[n^2]$ is

A. $\frac{z}{(z-1)^3}$

B. $\frac{z(z+1)}{z^3}$

C. $\frac{z(z+1)}{(z-1)^3}$

D. $\frac{z+1}{(z-1)^3}$

ANSWER: C

24. If $Z[f(k)] = F(z)$ then $Z[f(-k)]$ is

A. $F(z)$

B. $F\left(\frac{1}{z}\right)$

C. $F(k)$

D. $F\left(\frac{1}{k}\right)$

ANSWER: B

25. The inverse Z -transform of $f(z)$ can be found out by

A. synthetic division method

B. long division method

C. diagonalization method

D. Euler method

ANSWER: B

26. The value of $Z\left[\frac{1}{7^n}\right]$

A. $\frac{7z}{z-1}$

B. $\frac{7z}{7z-1}$

C. $\frac{z}{7z-1}$

D. $\frac{z}{z-1}$

ANSWER: B

27. If $y_{n+2} + 6y_{n+1} + 9y_n = 2^n$ with $y_0 = y_1 = 0$ then the value of $Z[y(n)] =$

A. $\frac{z}{(z-2)(z+3)^2}$

B. $\frac{z}{(z+2)(z+3)^2}$

C. $\frac{z}{(z-2)(z-3)^2}$

D. $\frac{1}{(z-2)(z+3)^2}$

ANSWER: A

28. The value of inverse Z -transform of $\frac{z}{(z-1)(z-2)}$ using residues

- A. 2^n
- B. $2^n - 1$
- C. $1 - 2^n$
- D. $2^n + 1$

ANSWER: B

29. The value of $Z^{-1} \left[\frac{z^2}{(z-a)^2} \right]$ using convolution theorem

- A. a^n
- B. na^n
- C. $(n-1)a^n$
- D. $(n+1)a^n$

ANSWER: D

30. $Z^{-1} \left[\frac{1}{z - \frac{1}{2}} \right] =$

- A. $2^n - 1$
- B. 2^{n-1}
- C. $\left(\frac{1}{2}\right)^{n-1}$
- D. $\left(\frac{1}{2}\right)^n$

ANSWER: C

31. If $Z[f(t)] = F(z)$ then $\lim_{z \rightarrow 1} (z-1)F(z) =$

- A. $f(0)$
- B. $f(\infty)$
- C. $f(1)$
- D. $f(z)$

ANSWER: B

32. $Z[n(n-1)] =$

- A. $\frac{z}{(z-1)^3}$
- B. $\frac{2z}{(z+1)^3}$
- C. $\frac{z}{(z+1)^3}$
- D. $\frac{2z}{(z-1)^3}$

ANSWER: D

33. $Z[\sin n\theta]$

- A. $\frac{\sin \theta}{z^2 - 2z \cos \theta - 1}$
- B. $\frac{\sin \theta}{z^2 - 2z \cos \theta + 1}$

- C. $\frac{z \sin \theta}{z^2 - 2z \cos \theta + 1}$
 D. $\frac{z \sin \theta}{z^2 + 2z \cos \theta + 1}$

ANSWER: C

34. The difference equation formed by eliminating ' a ' in $u_n = a2^{n+1}$ is

- A. $u_{n+1} - 2u_n = 0$
 B. $u_{n+1} = 0$
 C. $u_{n+1} - u_n = 0$
 D. $u_n = 0$

ANSWER: A

35. Solution of $u_n = 5u_{n-1}$, $n \geq 1$, $u_0 = 2$ is

- A. $u_n = 5^n$
 B. $u_n = 5.2^n$
 C. $u_n = 2.5^n$
 D. $u_n = 2^n$

ANSWER: C

36. Radius of curvature of $f(n) = u(n - n_0)$ is

- A. $|z| > 1$
 B. $|z| < \infty$
 C. $|z| < 1$
 D. $1 < |z| < \infty$

ANSWER: D

37. $Z[\cos n\theta]$

- A. $\frac{z \cos \theta}{z^2 - 2z \cos \theta - 1}$
 B. $\frac{z \sin \theta}{z^2 - 2z \cos \theta + 1}$
 C. $\frac{z \sin \theta}{z^2 + 2z \cos \theta + 1}$
 D. $\frac{z(z - \cos \theta)}{z^2 - 2z \cos \theta + 1}$

ANSWER: D

38. If $Z[(-1)^n] = \frac{z}{z+1}$, the ROC is

- A. $|z| > 1$
 B. $|z| > 2$
 C. $|z| < 1$
 D. $|z| = 1$

ANSWER: A

39. Partial fraction method involves

- A. Allotting coefficients
 B. Dividing the numerator by denominator to get fractions

C. Dividing single fraction into parts

D. None of the above

ANSWER: C

40. The region of convergence of the z transform of a unit step function is

A. $|z| > 1$

B. $|z| < 1$

C. Real part of $z > 0$

D. Real part of $z < 0$

ANSWER: A