CLASS TEST

S.No.: 01DLSK_ABC_27022026

MADE EASY

Leading Institute for IES, GATE & PSUs

Delhi | Bhopal | Hyderabad | Jaipur | Pune

Web: www.madeeasy.in | **E-mail:** info@madeeasy.in | **Ph:** 011-45124612

SIGNAL & SYSTEM

EC-EE

Date of Test : 27/02/2026

ANSWER KEY

1.	(a)	7.	(d)	13.	(b)	19.	(d)	25.	(b)
2.	(d)	8.	(d)	14.	(b)	20.	(c)	26.	(c)
3.	(a)	9.	(b)	15.	(d)	21.	(d)	27.	(d)
4.	(d)	10.	(c)	16.	(d)	22.	(c)	28.	(d)
5.	(b)	11.	(c)	17.	(c)	23.	(b)	29.	(a)
6.	(c)	12.	(c)	18.	(a)	24.	(a)	30.	(c)

DETAILED EXPLANATIONS

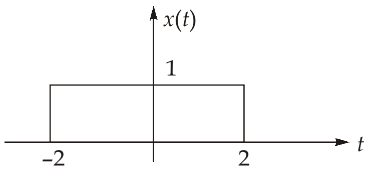
1. (a)

Let $$y(t) = \int_0^{10} [2x(t-3) * \delta(t-4)] \cdot dt$$

$$= \int_0^{10} [2x(t-7)] \cdot dt \qquad ...f(t) * \delta(t-t_0) = f(t-t_0)$$

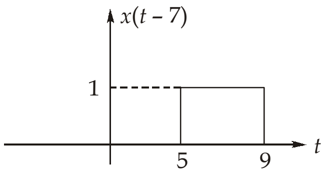
$$= 2\int_0^{10} x(t-7) \cdot dt$$

Since; $x(t)$ is defined as



For $x(t-7)$, delay $x(t)$ with 7 unit.

$\therefore$



$\therefore$ $$y(t) = 2\int_5^9 1 \cdot dt = 2 \times 4 = 8$$

2. (d)

$x(t)$	*TFS* Coefficients
Even signal	$b_k = 0;\ a_k \neq 0$
Odd signal	$b_k \neq 0,\ a_k = 0$
Even + HWS	$a_k \neq 0$ ....for odd value of k; $b_k = 0$
Odd + HWS	$b_k \neq 0$ ....for odd value of k; $a_k = 0$
HWS	$a_k \neq 0$ and $b_k \neq 0$ for odd value of k

3. (a)

We know, $$e^{-a|t|} \xleftrightarrow{FT} \frac{2a}{\omega^2 + a^2}$$

$\because$ $$G(\omega) = \frac{2}{\omega^2 + 2^2} = \frac{1}{2}\left[\frac{2 \cdot (2)}{\omega^2 + 2^2}\right]$$

Taking inverse Fourier transform

$$g(t) = \frac{1}{2} \cdot e^{-2|t|}$$

at $t = 0$ $$g(0) = \frac{1}{2} = 0.5$$

4. (d)

We know, $x(t) = 0.5\cos\left(2\pi t + \frac{\pi}{2}\right)$

$\because$ It is sampled with f_s = 4 Hz replace $t = nT_s = \frac{n}{f_s}$

$$x[n] = 0.5\cos\left[\frac{2\pi n}{f_s} + \frac{\pi}{2}\right] = 0.5\cos\left[\frac{2\pi n}{4} + \frac{\pi}{2}\right]$$

$$x[n] = 0.5\cos\left[\frac{\pi}{2}n + \frac{\pi}{2}\right]$$

at $n = 1$, $x[1] = 0.5\cos\pi = -0.5$

5. (b)

From pole zero plot; $H(z) = \frac{(z-1)(z+1)}{z} = \frac{z^2-1}{z} = z - z^{-1}$

$$H(z) = \frac{Y(z)}{X(z)} = z - z^{-1}$$

$$Y(z) = (z - z^{-1})\,X(z)$$

$$Y(z) = z \cdot X(z) - z^{-1} \cdot X(z)$$

Taking inverse z-transform

$$y[n] = x[n+1] - x[n-1]$$

Since, output sequence do NOT depends on its previous value, hence it is FIR filter.

6. (c)

Concept:

Convolution in time domain leads to multiplication in frequency domain. If

f_1 = Maximum frequency of $x_1(t)$

f_2 = Maximum frequency of $x_2(t)$

Maximum frequency of the convoluted signal,

$$(f_m)_{max} = f_1 \text{ when } f_1 < f_2$$
$$= f_2 \text{ when } f_2 < f_1$$

Now, for $x_1(t) = x\left(3t + \frac{1}{4}\right) \Rightarrow$ f_1 = 45 kHz

($\because$ Compression in time domain leads to expansion in frequency domain and vice-versa)

For $x_2(t) = x\left(1 + \frac{t}{3}\right) \Rightarrow$ f_2 = 5 kHz

Here, $f_2 < f_1 \Rightarrow f_{max} = 5$ kHz

$\therefore$ Nyquist rate of signal $y(t)$, $f_s = 2f_2 = 10$ kHz

7. (d)

- For energy signal,

$$E = \lim_{N\to\infty} \sum_{n=-N}^{N} |x[n]|^2 \Rightarrow \text{Finite value}$$

$$P = \lim_{N\to\infty} \frac{1}{2N+1} \sum_{n=-N}^{N} |x[n]|^2 \Rightarrow \text{Zero}$$

- For power signal,

$$E = \lim_{N \to \infty} \sum_{n=-N}^{N} |x[n]|^2 \quad \Rightarrow \text{Infinite value}$$

$$P = \lim_{N \to \infty} \frac{1}{2N+1} \sum_{n=-N}^{N} |x[n]|^2 \quad \Rightarrow \text{finite value}$$

- If energy and power both are infinite, then it is neither energy NOR power signal.

For $x(n) = 2^n \, u(-n)$

$$E = \lim_{N \to \infty} \sum_{n=N}^{0} 4^n = \frac{1}{1-\left(\frac{1}{4}\right)} = \frac{4}{3} = \text{Finite value}$$

8. (d)

For input $x_1[n]$; $\quad y_1[n] = \frac{1}{N} \sum_{K=0}^{N-1} x_1[n-K]$

For input $x_2[n]$; $\quad y_2[n] = \frac{1}{N} \sum_{K=0}^{N-1} x_2[n-K]$

The weighted sum of output is

$$ay_1[n] + by_2[n] = a\frac{1}{N} \sum_{K=0}^{N-1} x_1[n-K] + b\frac{1}{N} \sum_{K=0}^{N-1} x_2[n-K]$$

$$= \frac{1}{N} \sum_{K=0}^{N-1} [ax_1[n-K] + bx_2[n-K]]$$

$\therefore \quad y_3[n] = ay_1[n] + by_2[n] \quad$ ...(superposition principle satisfied)

9. (b)

Let, $\quad y(t) = x(t) \cdot \cos^2\omega_0 t$

$$= x(t)\left[\frac{\cos 2\omega_o t + 1}{2}\right]$$

$$y(t) = \frac{1}{2} x(t) \cdot \cos 2\omega_o t + \frac{x(t)}{2}$$

We have, Nyquist rate of $x(t) = \omega_0$

i.e. Maximum frequency of $x(t) = \frac{\omega_o}{2}$

We know, $\quad x(t) \cdot \cos 2\omega_o t \xrightarrow{\text{F.T.}} \frac{1}{2}[X(\omega - 2\omega_o) + X(\omega + 2\omega_o)]$

$\therefore$ Maximum frequency of $y(t) = \frac{\omega_o}{2} + 2\omega_o = \frac{5\omega_o}{2}$

Therefore, the Nyquist sampling rate,

$$\omega_s = 5\omega_o$$

10. (c)

Let, $$h_1[n] = 2\left(\frac{1}{2}\right)^n u[n] \xrightarrow{\text{F.T.}} \frac{2}{1-\frac{1}{2}e^{-j\Omega}}$$

Using modulation theorem,

$$x[n] \cdot A_c \sin\Omega_c n = \frac{A_c}{2j}[X(\Omega-\Omega_c) - X(\Omega+\Omega_c)]$$

$\therefore$ $$H(\Omega) = -j\left[\frac{1}{1-\frac{1}{2}e^{-j(\Omega-\pi/4)}} - \frac{1}{1-\frac{1}{2}e^{-j(\Omega+\pi/4)}}\right]$$

11. (c)

Energy of signal is not affected with time shifting and reversing of signal.
Hence, energy of $x(t)$ = Energy of $x(1 - t)$

Now, $$\text{Energy of } x(t) = \int_{-\infty}^{\infty} |x(t)|^2 \cdot dt = \int_{-1}^{3} |x(t)|^2 \cdot dt$$

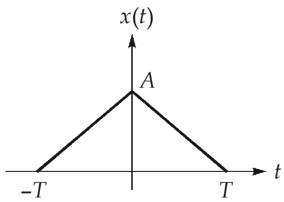
$$= \int_{-1}^{0} (t+1)^2 \cdot dt + \int_{0}^{1} 1 \cdot dt + \int_{1}^{2} 4 \cdot dt + \int_{2}^{3} (-3+t)^2 \cdot dt$$

$$= \left[\frac{(t+1)^3}{3}\right]_{-1}^{0} + 1 + 4 + \left[\frac{(t-3)^3}{3}\right]_{2}^{3}$$

$$= \frac{1}{3} + 1 + 4 + \frac{1}{3}$$

$$= \frac{17}{3} = 5.67 \text{ J}$$

12. (c)



$$\xleftrightarrow{FT} AT\,\text{sinc}^2(fT)$$

When; $$x(t) = A\,\text{tri}\left(\frac{t}{T}\right)$$

$$X(f) = AT\,\text{sinc}^2(fT)$$

$\because$ $$X(f) = 2\,\text{sinc}^2(f)$$

$\therefore$ $$A = 2,\ T = 1$$

hence, $$x(t) = 2\,\text{tri}(t)$$

13. (b)

Signal	Range
$x(t)$	t_1 to t_2
$h(t)$	t_3 to t_4
$y(t)$	$(t_1 + t_3)$ to $(t_2 + t_4)$
$x(2t-3)$	$\left(\frac{t_1+3}{2}\right)$ to $\left(\frac{t_2+3}{2}\right)$
$h(2t+4)$	$\left(\frac{t_3-4}{2}\right)$ to $\left(\frac{t_4-4}{2}\right)$
$x(2t-3)*h(2t+4)$	$\left(\frac{t_1+t_3}{2}\right)-\frac{1}{2}$ to $\left(\frac{t_2+t_4}{2}\right)-\frac{1}{2}$

} assume (for $x(t)$ and $h(t)$)

$\Rightarrow$ 3 to 7 (for $y(t)$)

$$t_1 + t_3 = 3 \quad \Rightarrow \frac{t_1+t_3}{2} - \frac{1}{2} = 1$$

$$t_2 + t_4 = 7 \quad \Rightarrow \frac{t_2+t_4}{2} - \frac{1}{2} = 3$$

14. (b)

$$X(\omega) = \sum_{n=-\infty}^{\infty} x(n)e^{-j\omega n} = \sum_{n=-4}^{4} n\,e^{-j\omega n}$$

$$= \sum_{k=1}^{4}\left[ke^{-j\omega k} - k^{+j\omega k}\right] = \sum_{k=1}^{4} k[-j2\sin(k\omega)]$$

$$= -j2\sum_{k=1}^{4} k\sin(k\omega)$$

15. (d)

We know,

- $$y[n-1] \xrightarrow{UZT} z^{-1}\cdot Y(z) + y(-1)$$
- $$y[n+1] \xrightarrow{UZT} z\cdot Y(z) - z\cdot y(0)$$

Now,

$$y[n] + y[n-1] + y[n+1] = 0$$

Taking unilateral z-transform,

$$Y(z) + z^{-1}Y(z) + y(-1) + zY(z) - zy(0) = 0$$

$$Y(z)[1 + z^{-1} + z] = zy(0) - y(-1)$$

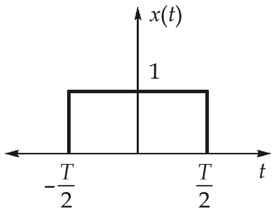
$$Y(z) = \frac{z-1}{1+z^{-1}+z} = \frac{z^2-z}{z^2+z+1}$$

$$Y(z) = \frac{z(z-1)}{(z+0.5)^2 + 0.75}$$

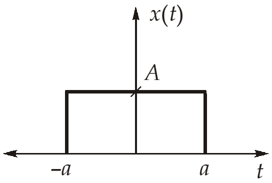
16. (d)

Let ,

$$x(t) = \text{rect}\left[\frac{t}{T}\right] \Rightarrow$$

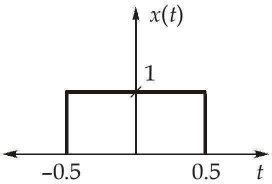


We know,



$$\xrightarrow{\text{F.T.}} A\left[\frac{2\sin a\omega}{\omega}\right]$$

If, $A = 1,\ a = 0.5$



$$\xrightarrow{\text{F.T.}} \frac{2\sin\frac{\omega}{2}}{\omega}$$

$\because$
$$y(t) = \text{rect}\left[2t - \frac{1}{2}\right]$$

$$y(t) = x[2t - 0.5]$$

$$Y(\omega) = \frac{1}{2}e^{-\frac{j\omega}{4}} X\left(\frac{\omega}{2}\right)$$

$\because$
$$X(\omega) = \frac{2\sin\frac{\omega}{2}}{\omega}$$

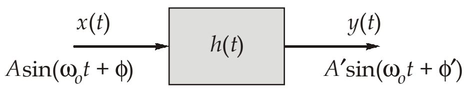
$\therefore$
$$Y(\omega) = \frac{1}{2}e^{-\frac{j\omega}{4}} \cdot \left(\frac{2\sin\frac{\omega}{4}}{\frac{\omega}{2}}\right) = 2e^{-\frac{j\omega}{4}}\left(\frac{\sin\frac{\omega}{4}}{\omega}\right)$$

$$= \frac{1}{2}e^{-\frac{j\omega}{4}} Sa\left[\frac{\omega}{4}\right]$$

where $Sa(\omega) \Rightarrow$ Sampling function

17. (c)

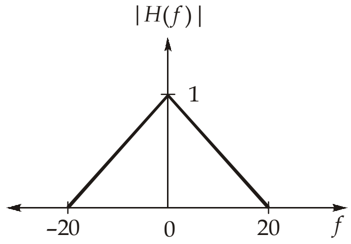
With sinusoidal input, to an of LTI system,



where,
$$A' = A\cdot\left|H(\omega)\right|_{\omega=\omega_o}$$

$$\phi' = \phi + \angle H(\omega)\big|_{\omega=\omega_o}$$

Now, $20\sin c^2 20t \xrightarrow{\text{F.T.}}$



$$x(t) = 16\cos\left(20\pi t + \frac{\pi}{3}\right) + 8\sin\left(80\pi t + \frac{\pi}{4}\right)$$

$$\Downarrow \quad f = 10 \text{ Hz} \qquad \Downarrow \quad f = 40 \text{ Hz}$$

Only f = 10 Hz will be allowed and f = 40 Hz will not reach at output.

$\therefore$ $$|H(f)|_{f=10} = 0.5 \text{ and } |H(f)|_{f=40} = 0$$

$$\angle H(f)|_{f=10} = 30° = \frac{\pi}{6}$$

$\therefore$ $$y(t) = 8\cos\left[20\pi t + \frac{\pi}{3} + \frac{\pi}{6}\right] = 8\cos\left[20\pi t + \frac{\pi}{2}\right]$$

$$y(t) = -8\sin 20\pi t$$

18. (a)

Let, $$y(t) = t \cdot f(t)$$

$$Y(s) = -\frac{d}{ds}F(s) = -\frac{d}{ds}\left[\log\frac{s^2+1}{s(s+1)}\right]$$

$$Y(s) = \frac{-2s}{s^2+1} + \frac{1}{s} + \frac{1}{s+1}$$

Taking inverse Laplace, $$y(t) = \left[-2\cos t + 1 + e^{-t}\right]u(t)$$

Now, $$f(t) = \frac{y(t)}{t}$$

$$f(t) = \frac{-2\cos t + 1 + e^{-t}}{t}$$

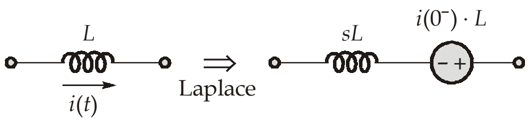
Using L'Hospital rule $\left[\text{Because } f(0) = \frac{0}{0}\right]$

$$\lim_{t\to 0^+} f(t) = 2\sin t - e^{-t}$$

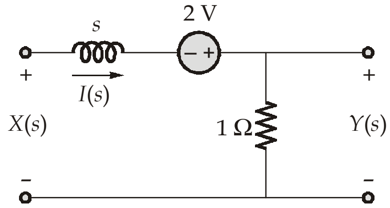
$$f(0^+) = -1$$

19. (d)

When inductor have its initial current value,



From given circuit,



$$\therefore \quad I(s) = \frac{X(s)+2}{s+1}$$

Now,
$$Y(s) = I(s)\cdot R = \frac{X(s)+2}{s+1} = \frac{X(s)}{s+1} + \frac{2}{s+1}$$

To find unit step response, consider

$$x(t) = u(t)$$

$$X(s) = \frac{1}{s}$$

$$Y(s) = \frac{1}{s(s+1)} + \frac{2}{s+1}$$

$$Y(s) = \frac{2s+1}{s(s+1)}$$

Now, by inverse Laplace transform,

$$y(t) = (1 + e^{-t})\, u(t)$$

20. (c)

- With change of time period, Fourier series coefficient does not change. i.e.

$$b_K = a_K$$

$\therefore$ If
$$\sum_{K=-\infty}^{\infty} |a_K| = 20$$

then,
$$\sum_{K=-\infty}^{\infty} |b_K| = 20$$

- With change in time period, we observe change in time period of corresponding signal. i.e. if $x(t)$ has time period T

$y(t)$ has time period $\frac{T}{a}$ for $y(t) = x(at) \quad ; \quad a > 1$

$\therefore$ Fundamental frequency of $y(t)$ will be

$$\omega' = \frac{2\pi}{\frac{T}{a}} = a\left[\frac{2\pi}{T}\right]$$

here,
$$a = 2, \quad T = 2 \text{ sec}$$

$\therefore$
$$\omega' = 2\pi \text{ rad/sec}$$

- From Parseval's theorem

$$\frac{1}{T}\int_0^T |x(t)|^2 \cdot dt = \sum_{K=-\infty}^{\infty} |a_K|^2 = \sum_{K=-\infty}^{\infty} |b_K|^2$$

21. (d)

when, $$x[n] = u[n]$$

$$X(z) = \frac{z}{z-1}$$

We have, $$y[n] = x[n] - y[n-1]$$

$$H(z) = \frac{1}{1+z^{-1}} = \frac{z}{z+1}$$

$\therefore$ $$Y(z) = \frac{z^2}{(z+1)(z-1)}$$

$$\frac{Y(z)}{z} = \frac{A}{z+1} + \frac{B}{z-1}$$

$$A = B = \frac{1}{2}$$

$$Y(z) = \frac{1}{2}\frac{z}{z+1} + \frac{1}{2}\frac{z}{z-1}$$

Taking inverse z-transform for ROC

$$|z| > 1 \text{ ... causal system}$$

$$y[n] = \frac{1}{2}(-1)^n u[n] + \frac{1}{2}(1)^n u[n]$$

when 'n' is even

$$y[n] = \frac{u[n]+u[n]}{2}$$

22. (c)

$$X[k] = \sum_{n=0}^{N-1} x[n]e^{-j\frac{2\pi}{N}kn}$$

We know, $$X\left[\frac{N}{2}\right] = x[0] - x[1] + x[2] - x[3] + x[4] - x[5] + x[6] - x[7]$$

$$= 0 - 1 + 2 + 1 + 5 - 2 + 7 - 0 = 12$$

Note: $$X[0] = \sum_{n=0}^{N-1} x[n]$$

$$= x[0] + x[1] + x[2] + x[3] + \ldots$$

23. (b)

Since $x(t)$ is real and even, hence C_k is also real and even i.e. $C_k = C_{-k}$

We have, $$C_k = \begin{cases} (-1)^k & ; \quad 1 \le k \le 3 \\ 0 & ; \quad k > 3 \end{cases}$$

$$C_1 = C_{-1} = -1$$
$$C_2 = C_{-2} = 1$$
$$C_3 = C_{-3} = -1$$

Parseval's power theorem,

$$\frac{1}{T}\int_0^T |x(t)|^2 \cdot dt = \sum_{k=-\infty}^{\infty} |C_k|^2$$

$$\therefore \quad \text{Power of } x(t) = [C_0]^2 + 2[C_1^2 + C_2^2 + C_3^2]$$

$$42 = C_0^2 + 2[1+1+1]$$

$$|C_0| = 6$$

where $C_0 \rightarrow$ Average value of $x(t)$.

24. (a)

We have, $$x[n] = \left(\frac{1}{2}\right)^n u[n-1]$$

Its z-transform is, $$X(z) = \frac{1}{2z-1}$$

$$\because \quad y[n] = \sum_{K\to-\infty}^{n} x[K] = u[n] * x[n]$$

It z-transform is; $$Y[z] = \left(\frac{1}{1-z^{-1}}\right)\left(\frac{1}{2z-1}\right) = \frac{z}{(z-1)(2z-1)}$$

$$\therefore \quad Y[2] = \frac{2}{3} = 0.66$$

25. (b)

$$I = \int_{-\infty}^{2} \cos\frac{\pi}{2}t \cdot \delta'(2t-1)dt + \underbrace{\int_{-\infty}^{2} \cos\frac{\pi}{2}t \cdot \delta(t-4)dt}_{\Downarrow \; 0}$$

$$= \int_{-\infty}^{2} \cos\frac{\pi}{2}t \cdot \delta'(2t-1)dt$$

$$= \int_{-\infty}^{2} \cos\frac{\pi}{2}t \cdot \frac{1}{2}\delta'\left(t-\frac{1}{2}\right)dt \qquad \left[\because \delta(2t-1) = \frac{1}{2}\delta\left(t-\frac{1}{2}\right)\right]$$

$$= \frac{1}{2} \cdot \int_{-\infty}^{2} \cos\frac{\pi}{2}t \cdot \delta'\left(t-\frac{1}{2}\right)dt$$

$$= \frac{1}{2} \times (-1)\frac{d}{dt}\left(\cos\frac{\pi}{2}t\right)\Bigg|_{t=1/2}$$

$$= \frac{-1}{2} \cdot \left(-\frac{\pi}{2}\sin\frac{\pi}{2}t\right)\Bigg|_{t=1/2} = \frac{\pi}{4}\sin\frac{\pi}{4} = \frac{\pi}{4} \times \frac{1}{\sqrt{2}} = \frac{\pi}{4\sqrt{2}}$$

26. (c)

for band pass signal, Minimum sampling frequency,

$$f_{s\,\min} = \frac{2f_H}{k}$$

where,
$$k = \left\lfloor \frac{f_H}{BW} \right\rfloor$$

$$f_H = 5 \text{ MHz}$$
$$\text{BW} = (5 - 3.5)\text{MHz} = 1.5 \text{ MHz}$$

$$\therefore \quad k = \left\lfloor \frac{5}{1.5} \right\rfloor = 3.33 = 3$$

$$\therefore \quad f_{s\,\min} = \frac{2 \times 5 \text{ MHz}}{3} = 3.33 \text{ MHz}$$

27. (d)

From the given system,

$$x(t) - \frac{3}{4}\frac{dy(t)}{dt} - \frac{1}{8}y(t) = \frac{d^2y(t)}{dt^2}$$

By taking Laplace transform,

$$X(s) = Y(s)\left[s^2 + \frac{3}{4}s + \frac{1}{8}\right]$$

$$H(s) = \frac{Y(s)}{X(s)} = \frac{1}{s^2 + \frac{3}{4}s + \frac{1}{8}} = \frac{A}{s + \frac{1}{2}} + \frac{B}{s + \frac{1}{4}}$$

$$= \frac{-4}{s + \frac{1}{2}} + \frac{4}{s + \frac{1}{4}}$$

$$\therefore \quad h(t) = -4[e^{-0.5t} - e^{-0.25t}]\, u(t)$$

28. (d)

$$x(t) = \left[\frac{e^{-3t} - e^{-2t}}{t}\right]u(t)$$

$$-tx(t) = [e^{-2t} - e^{-3t}]\, u(t)$$

Applying Laplace transform on both side

$$\frac{d}{ds}X(s) = \frac{1}{s+2} - \frac{1}{s+3}$$

$$X(s) = \log(s + 2) - \log(s + 3)$$

29. (a)

With $N = 4$ we obtain the transfer function

$$H(z) = \frac{1}{4}\left(z^{-1} + z^{-2} + z^{-3} + z^{-4}\right)$$

After writing,
$$H(z) = \frac{1}{4}\left[\frac{z^3 + z^2 + z + 1}{z^4}\right]$$

Clearly there are 4 poles at $z = 0$, and there are three zeros from the solution

i.e.
$$z^3 + z^2 + z + 1 = \frac{1 - z^4}{1 - z} = 0$$

$\therefore$ Zeros must be such that $z^4 = 1$, with exclusion of $z = 1$.

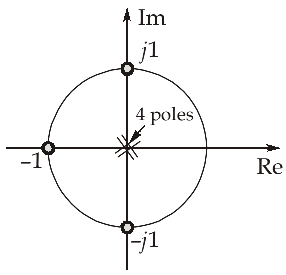
This is to say
$$z^4 = e^{jk2\pi} \quad \text{for } k = 1, 2, 3$$

$$z = e^{jk\frac{\pi}{2}} \quad \text{for } k = 1, 2, 3$$

For $k = 1$,
$$z = e^{j\frac{\pi}{2}} = \cos\frac{\pi}{2} + j\sin\frac{\pi}{2} = j$$

$k = 2$,
$$z = e^{j\pi} = \cos\pi + j\sin\pi = -1$$

$k = 3$,
$$z = e^{j\frac{3\pi}{2}} = \cos\left(\frac{3\pi}{2}\right) + j\sin\left(\frac{3\pi}{2}\right) = -j$$



30. (c)

Given,
$$X(z) = \ln\left(\frac{\alpha}{\alpha - z^{-1}}\right); \text{ ROC}; |z| > \frac{1}{\alpha}$$

$$= -\ln\left(1 - (\alpha z)^{-1}\right)$$

now, by expanding using Taylor series,

$$X(z) = \left[(\alpha z)^{-1} + \frac{(\alpha z)^{-2}}{2} + \frac{(\alpha z)^{-3}}{3} + ...\right]$$

$$= \sum_{k=1}^{\infty} \frac{[(\alpha z)^{-1}]^k}{k}$$

$$X(z) = \sum_{k=1}^{\infty} \frac{\alpha^{-k}}{k} \cdot z^{-k}$$

Taking the inverse z-transform,

$$x[n] = \sum_{k=1}^{\infty} \frac{\alpha^{-k}}{k}\delta(n-k) \qquad \left[\because \delta(n-k) \leftrightarrow z^{-k}\right]$$

$\therefore$
$$x[n] = \left(\frac{\alpha^{-n}}{n}\right)u(n-1)$$

■■■■