Medium | Deputy Executive Engineer (Electric | 2026 | orts Authority of Gujarat / Assistant Engineer (El

With respect to convolution in discrete-time systems, consider the following statements: 1. Convolution represents the output of an LTI system as a

A **1, 2 and 4 only** — Correct

B 2 and 3 only

C 1 and 3 only

D All of the above

Correct Answer: A

Full Detailed Explanation

Correct Answer: A - 1, 2 and 4 only Quick Concept Explanation Convolution is the bridge between an input signal and the impulse response of an LTI system. The time-reversal step arises because the kernel is h[n k] or h(t), not h[k n]. Key relation: DT: y[n]= _{k= }^{ }x[k]h[n k]. CT: y(t)= x( )h(t)d . Finite DT length: Ly=Lx+Lh 1.Exam focus: Graphical convolution sequence: fold shift multiply sum. Common trap: Confusing convolution with element-wise multiplication or assuming output length always decreases. Statement-wise Verification Statement 1 - Correct.Convolution represents the output of an LTI system as a weighted sum of shifted impulse responses.Y[n]= x[k]h[n k] is literally a weighted sum of shifted impulse responses h[n k]. Statement 2 - Correct.The graphical method of convolution involves time reversal and shifting of one signal.The graphical procedure reverses one signal, shifts it, multiplies overlap values and sums/integrates. Statement 3 - Incorrect.Convolution operation always reduces the length of the output sequence.For finite sequences of lengths Lx and Lh, full linear convolution normally has length Lx+Lh 1, which is often longer than either input. Statement 4 - Correct.Convolution is valid for both continuous-time and discrete-time signals.Convolution is defined as an integral in